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Food tech

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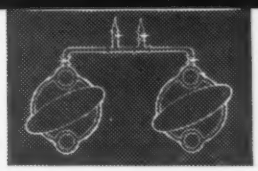

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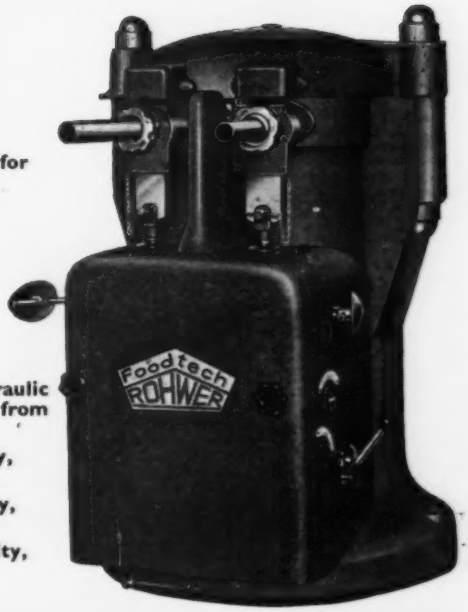

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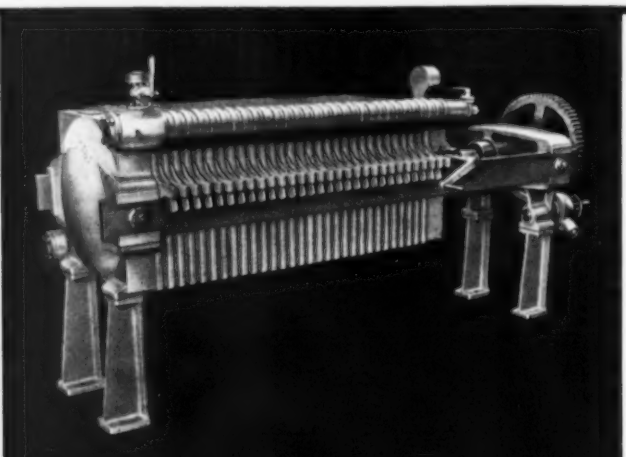

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The data on this shelf test is shortly to be published; your glass container manufacturer will be happy to let you have a copy.

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5-3

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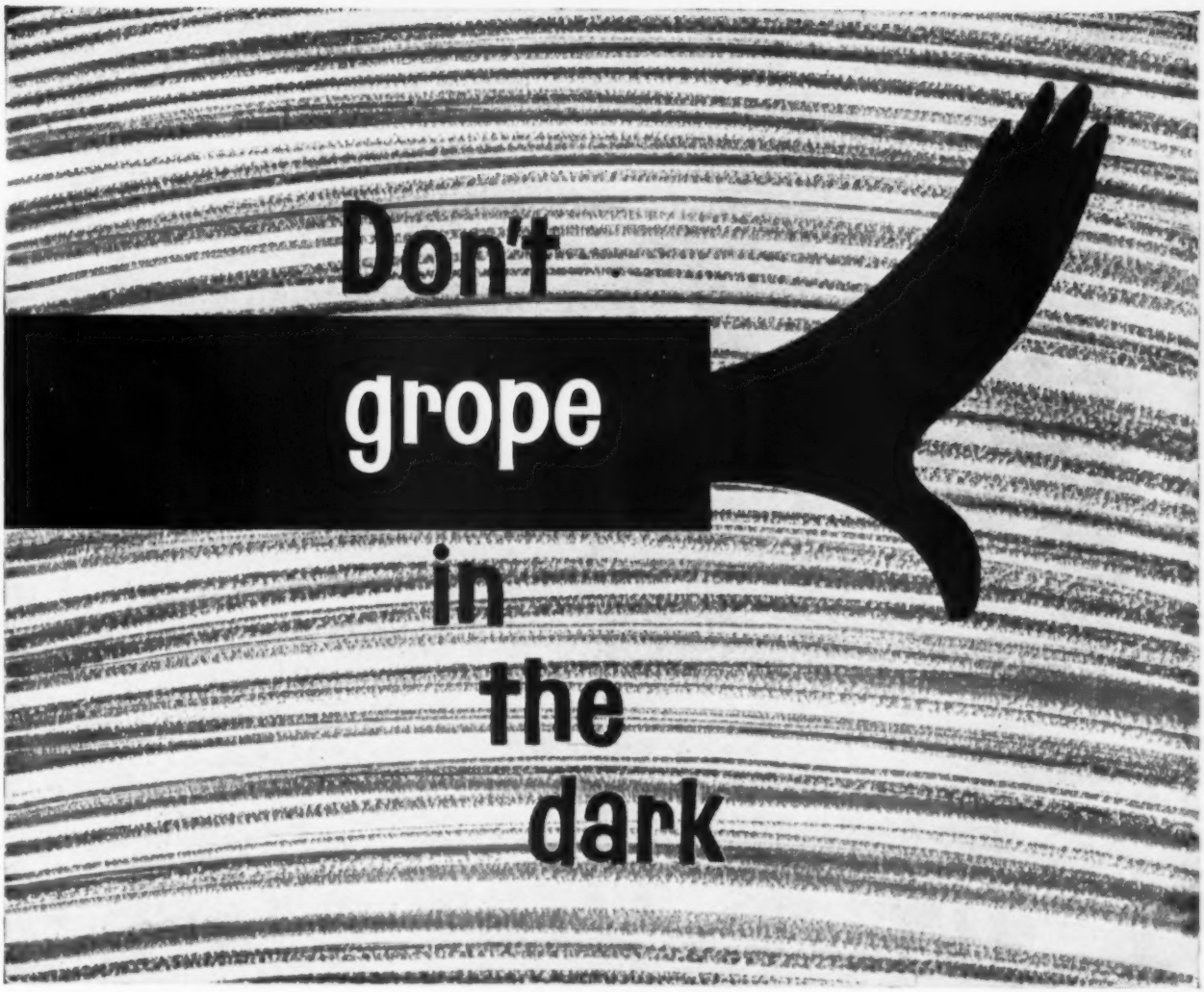

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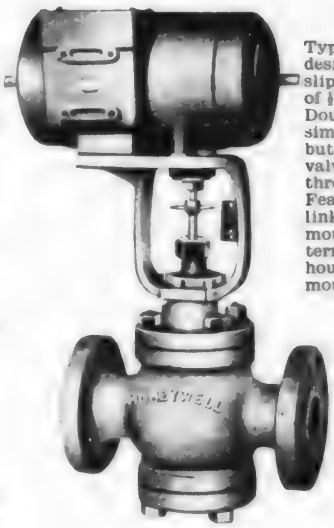

Type B Actionator motors are designed for vertical acting slip stem valves having lifts of ¼ inch through 1¼ inches. Double ended shaft can also simultaneously operate butterfly valves, rotary stem valves and other devices through suitable linkages. Features include built-in linkage and strain relief, mounting yoke and enclosed terminals with gasketed housing. No auxiliary mounting bracket required.

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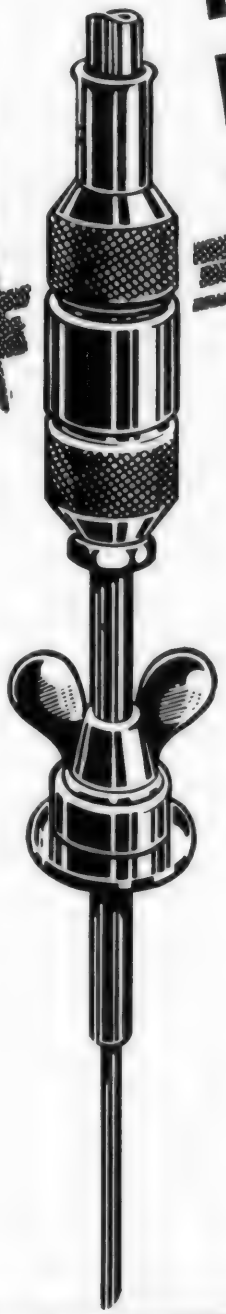
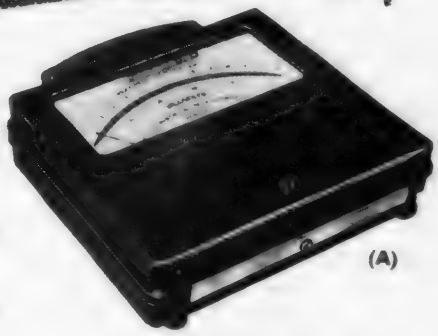
of canned foods in an autoclave



These special thermocouples developed for use in the food and kindred processing industries are widely used because of their accuracy, interchangeability, rapid response and robustness, and can therefore be relied upon to give long and trouble-free service.



(A)

These thermocouples may be used with a variety of temperature indicating and/or recording instruments, three examples of which are illustrated on the right. These are (a) Portable Indicator with 7" long mirrored scale, (b) Electronic Self-Balancing Indicator/Recorder giving continuous record on disc type chart and (c) a Teloscale Indicator which indicates the temperature of the thermocouple on a translucent scale having an effective length of over 50 inches, thus permitting temperature readings to be accurately observed from a considerable distance.

(B)

(C)

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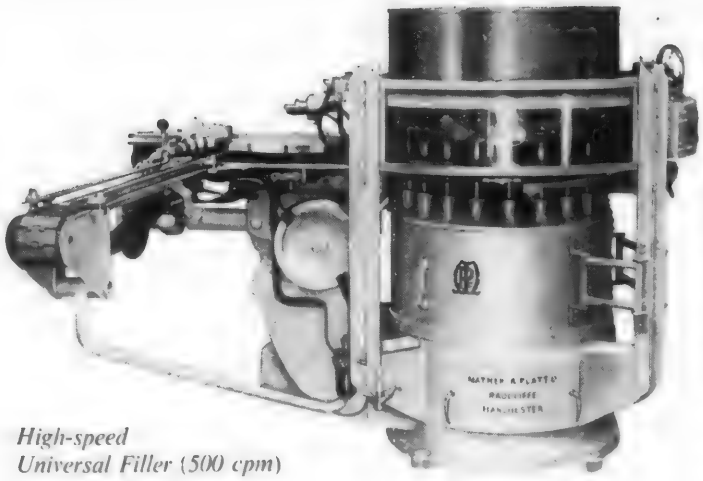
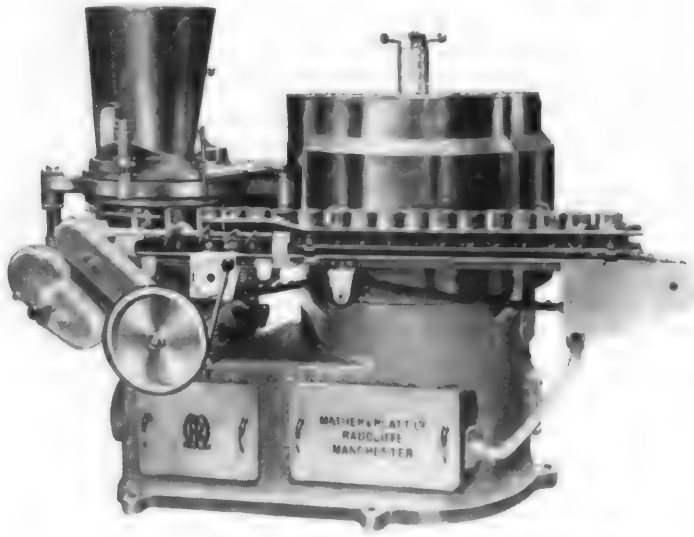
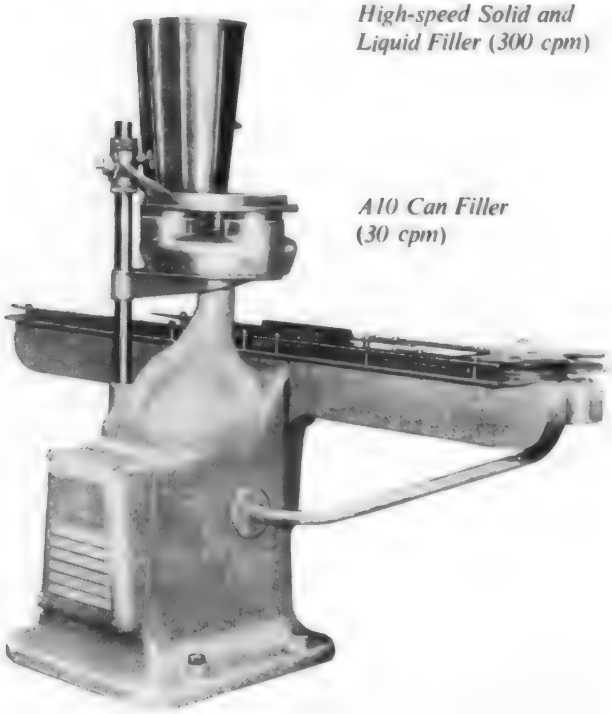


High-speed Universal Filler (500 cpm)



High-speed Solid and Liquid Filler (300 cpm)



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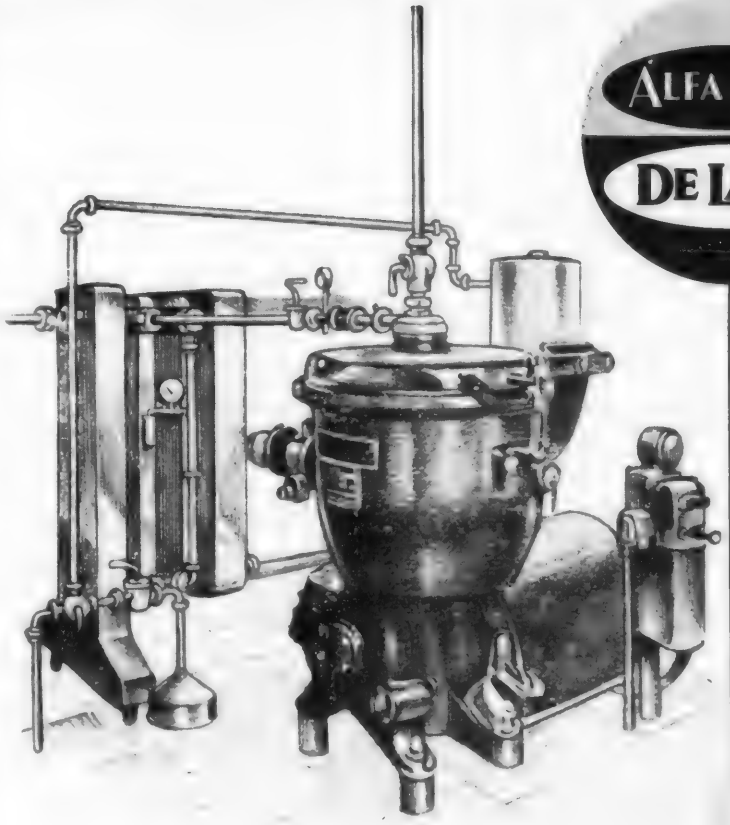

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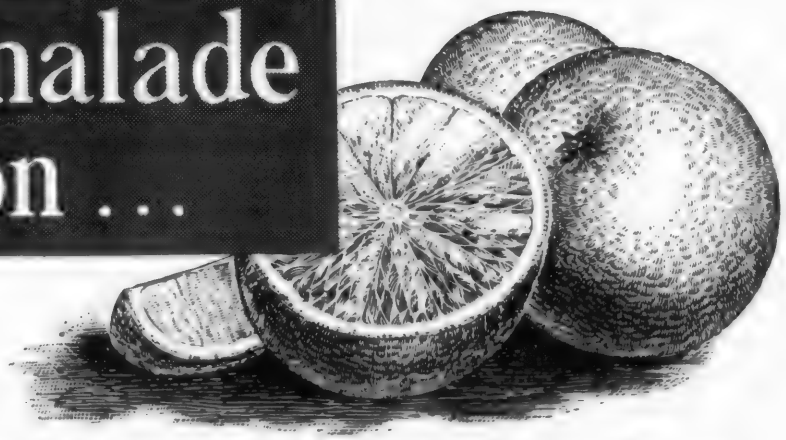

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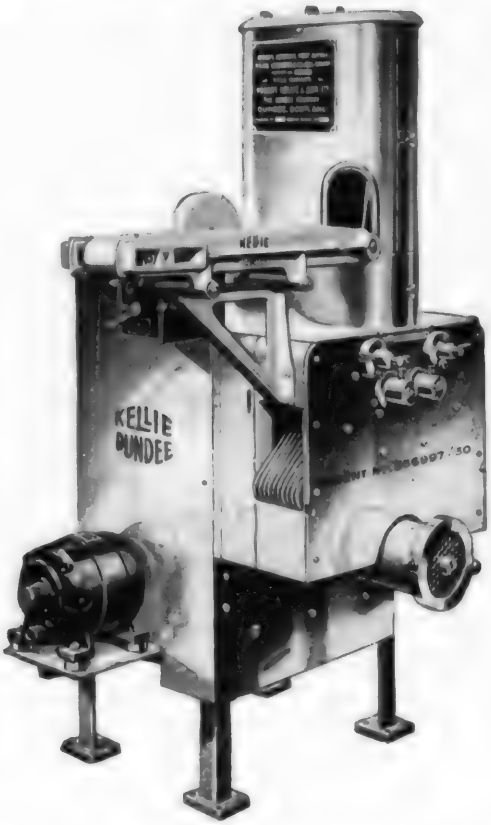

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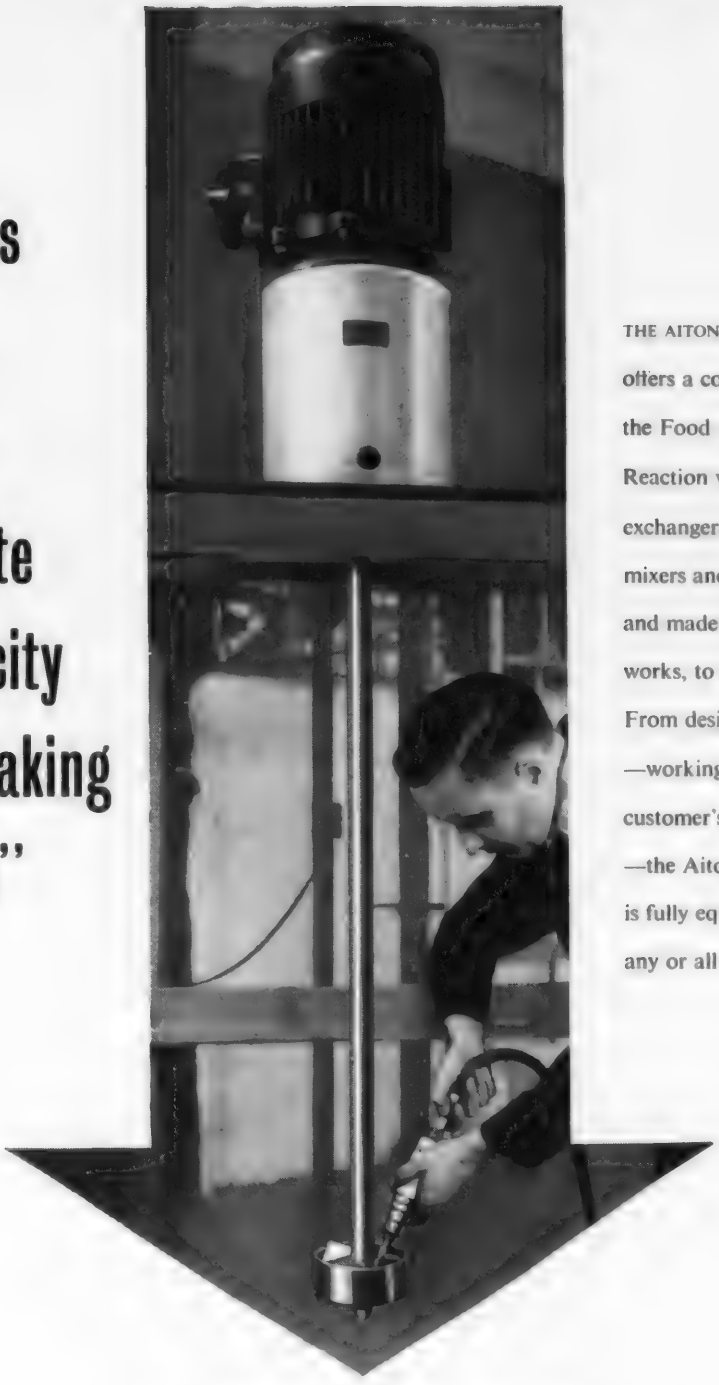

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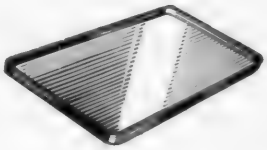

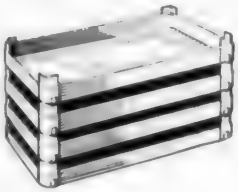

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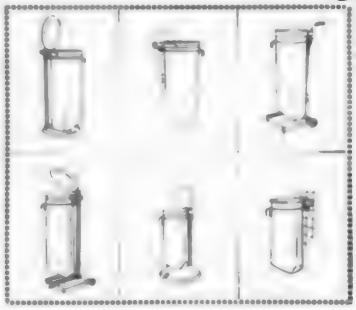

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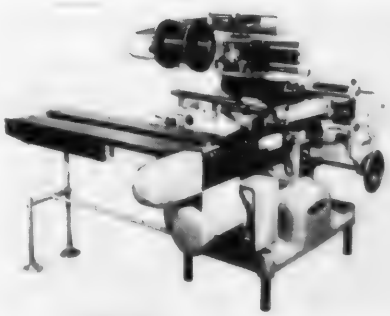

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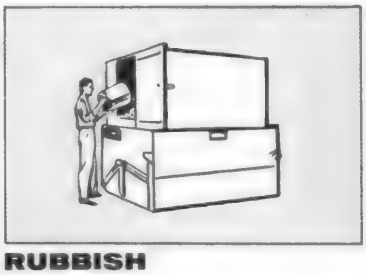
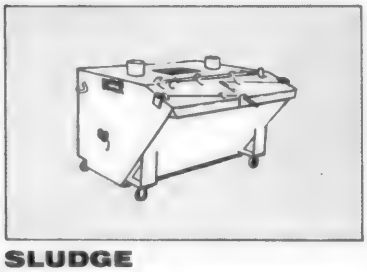


RUBBISH



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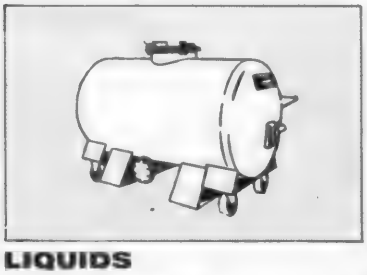

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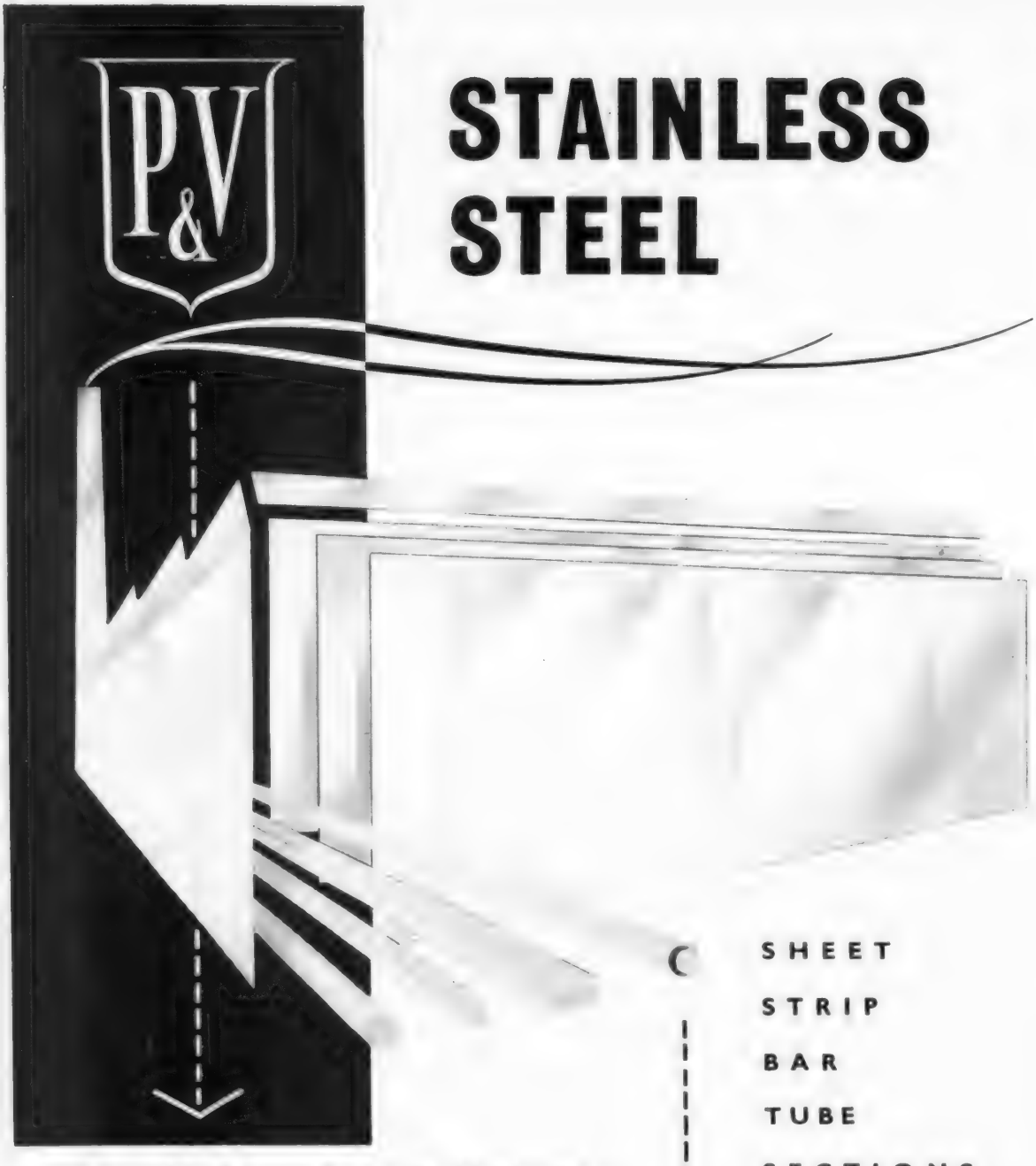

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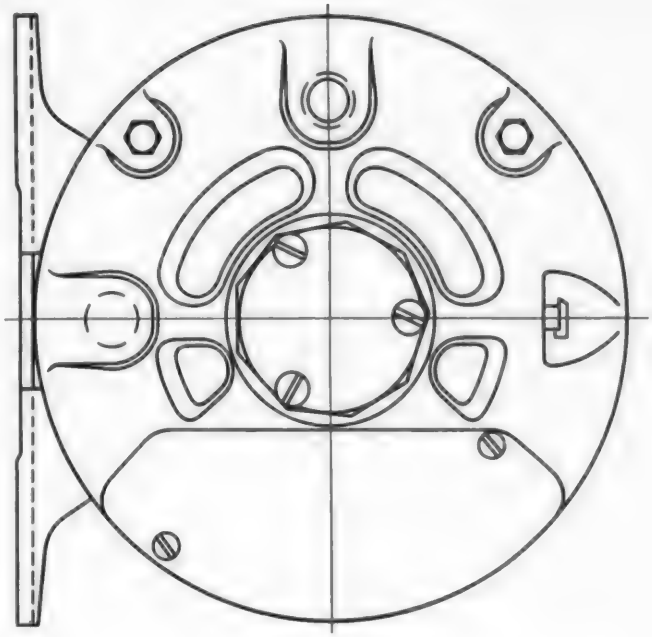

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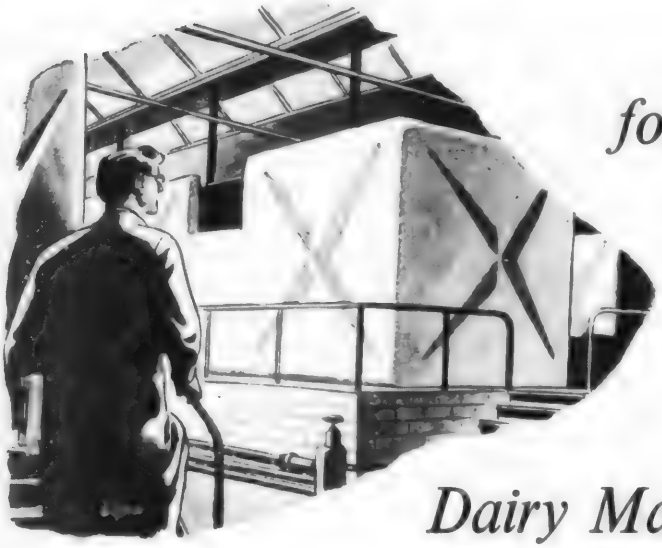

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THE BRITISH HYDROLOGICAL CORPORATION

COLLOIDAL WORKS · HIGH PATH · MERTON · LONDON S.W.19. Telephone: LIBERTY 1021 (5 lines)

ASSOCIATED COMPANIES: Colloidal Detergents of Australia Ltd., Australia. Chemical Services (Pty.) Ltd., S. Africa. And at Amsterdam, Brussels, Copenhagen, Dublin, Helsinki, Johannesburg, Oslo, Gothenburg, Lille, Lyon, Zurich, Paris, Sydney, Limassol Cyprus, Kingston Jamaica, Nairobi, New Plymouth New Zealand, Port of Spain Trinidad, Brescia Italy.

CORPORATION

and Sterilants

Bottle Washing . . .

Equipment . . . bacteria-free

sterilised Food–

detergency problems

and Allied Industries.

B.H.C. Laboratories — the only analytical laboratories in the world specialising in detergency problems *and nothing else*.

THE BHC GROUP

PLEASE AVAIL YOURSELF OF OUR FREE, TROUBLE-SERVICE.

We are having a little difficulty with .....

Mr. .....

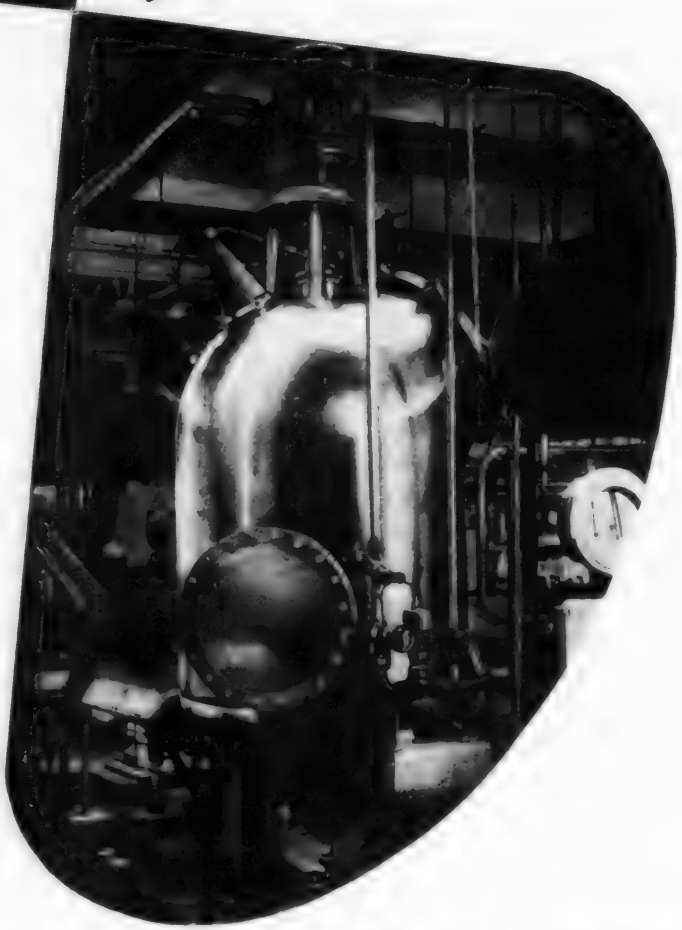
Name of Firm .....

Address .....

★

Illustration shows Stainless Steel Jacketed Pans which are available from stock.

FOR PURPOSE ..FITNESS



For whatever purpose plant is required, we can design, manufacture and install it. Our qualified engineers are ready to help you with your particular problems and will submit their suggestions and ideas quickly and expertly. May we have your enquiries?

We specialise in

TANKS. HIGH AND LOW PRESSURE VESSELS. VACUUM RECEIVERS. DISTILLATION PLANTS. AGITATORS. HEAT EXCHANGERS. MOBILE VESSELS AND TANKERS. CONE BLENDERS. BOILING PANS. HOPPERS, etc.

Manufactured in

STAINLESS STEEL. "MONEL" METAL. NICKEL, ALUMINIUM AND MILD STEEL.

FABRICATORS TO INDUSTRY — SP LTD — A SERVICE IN STAINLESS STEEL

STAINLESS STEEL PLANT LIMITED

Head Office and Works:

DORSET AVENUE, THORNTON GATE, CLEVELEYS, LANCS.

Telephone: **CLEVELEYS 2234/5-3070.** *Telegrams:* **Stainless Cleveleys.**

LONDON OFFICE: ELTHAM 1280 **MANCHESTER OFFICE: ECCLES 4118**

This large bacon distributor also chooses

Colour printed METATHENE

POLYTHENE COATED CELLULOSE FILM

The Danish Bacon Co. Ltd. use colour printed Metathene pockets and MB vacuum drawing and pocket sealing machines for their new pack.

Metathene polythene coated cellulose film was chosen by the Danish Bacon Company because it is ideal for vacuum packaging. Its bond strength is exceptional—a vitally important point. Notice the strikingly bold use of colour. The smallest lettering is clear. All the print is safely locked in between the two films where it cannot get rubbed, and it is given a really eye-catching sheen. DBC have a good pack here!

Transparent, tough, flexible Metathene is used extensively too for vacuum packaging cheese, and also for the packaging of coffee, jam, vinegar pickles, and even hardware items such as tractor spares.

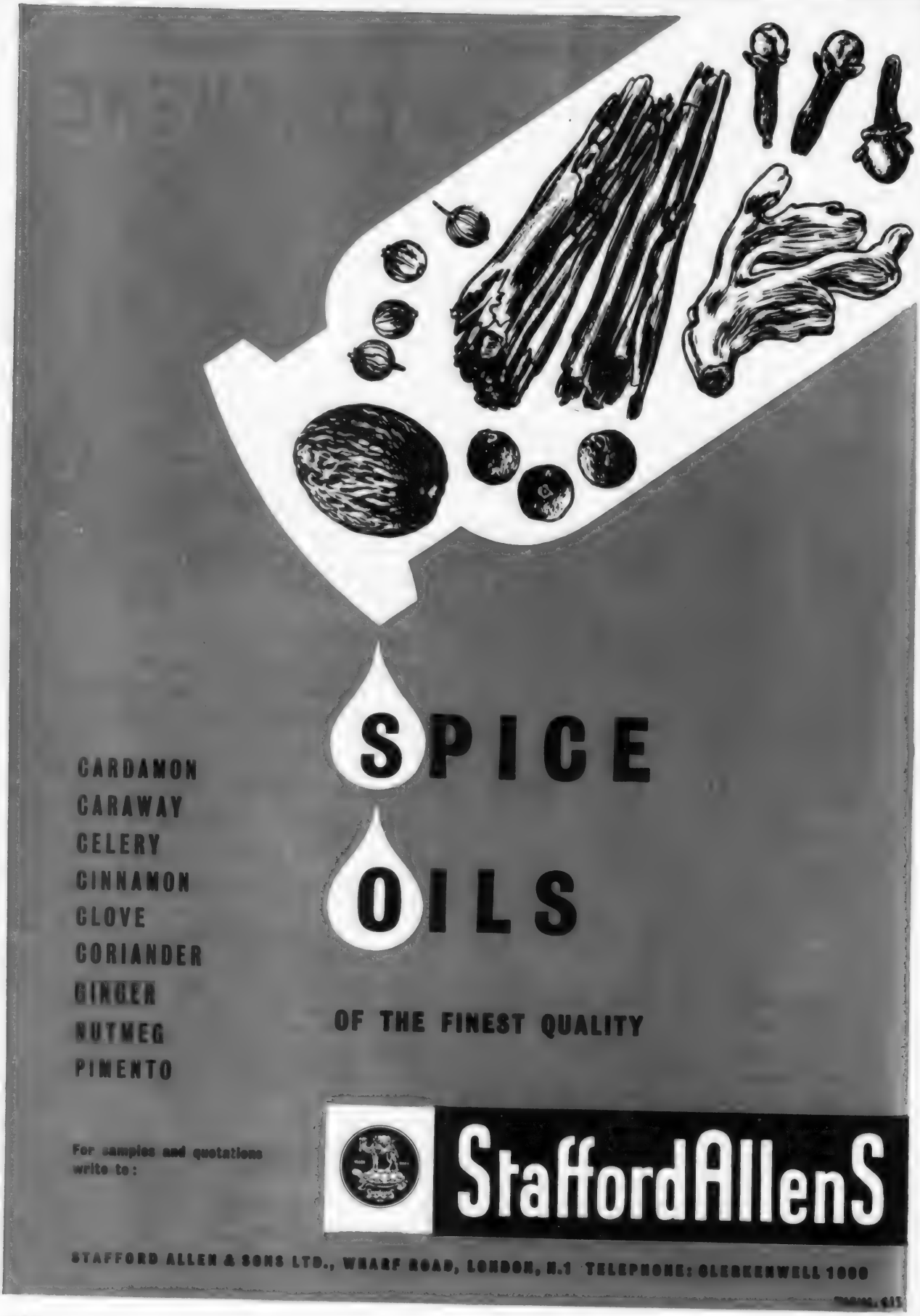
THE MB VACUUM DRAWING AND POCKET SEALING MACHINE

A single operator places filled ½ lb. bacon pockets on a belt and the machine draws the vacuum, seals, and ejects the sealed pockets automatically at speeds of up to 50 a minute. Ask for full details today.

METAL BOX PLASTICS

THE PLASTICS GROUP OF THE METAL BOX COMPANY LIMITED · 37 BAKER STREET · LONDON W.1 · HUNTER 5577

MB54/07A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OF THE FINEST QUALITY
For samples and quotations write to:
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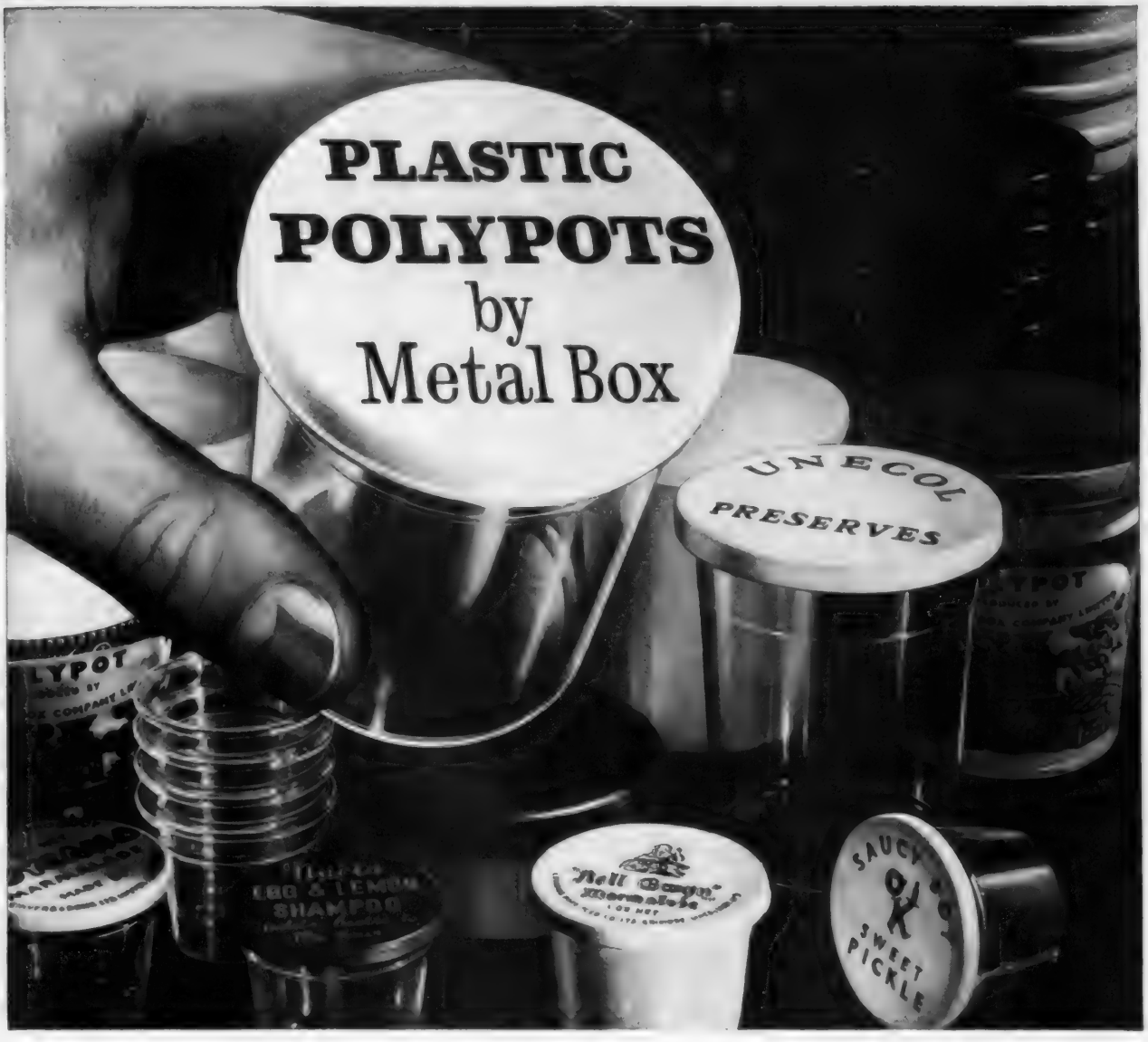
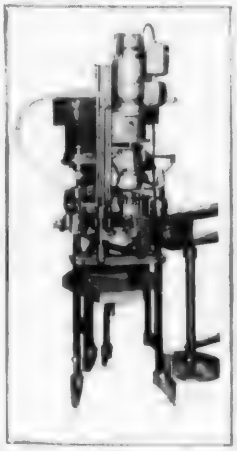
STAFFORD ALLEN & SONS LTD., WHARF ROAD, LONDON, N.1 TELEPHONE: CLERKENWELL 1000



Polypots are made of polystyrene; they are well designed, light, tough and splinter-proof. Moulded either clear, or in a variety of brilliant colours, their attractive appearance can be enhanced by Metal Box colour printing on both the pots and the snap-on polythene caps which provide hygienic protection for the contents. Metal Garda caps and paper caps can also be supplied.

For more information write or phone to :



FILL AND CLOSE miniature Polypots with this unique machine. Minimum storage and working area and labour costs make this a really economic proposition.

METAL BOX PLASTICS GROUP

PLASTIC FILMS · LAMINATIONS · BOTTLES · MOULDED CONTAINERS

THE PLASTICS GROUP OF THE METAL BOX COMPANY LIMITED, 37 BAKER STREET, LONDON W.1. Hunter 5577

MB55/10

expo 58

Czechoslovak micro malt plant type EXPO-58 Brussels

Indispensable equipment for all malt plants and malt research institutes. At the World Exhibition in Brussels it was awarded a gold medal.

TECHNOEXPORT

Prague CZECHOSLOVAKIA

"There's more to Sellotape than just tearing off a strip..."

REGD. TRADE MARK

says the man with the little black box

Time and cost-saving SELLOMATION ideas can be tailored to fit a production line, a packaging or packing operation or—in the marketing of a product—a publicity campaign.

If asked to define the aims of the service in one word, we would say SIMPLIFICATION. In all fairness, we must add that the magic simplifying touch of "Sellotape" is not brought about by one self-adhesive product. There is a whole range of stick-at-a-touch media, containing products widely differing in character, that have been specially produced to solve the problems of many industries.

Our consultants are the key to the situation because they know all about them. Can you really afford to be without *full* information on the SELLOMATION SERVICE?

Your call to BIShopsgate 6511 may offer the challenge that makes our job worthwhile.

THE SELLOMATION SERVICE

GORDON & GOTCH (SELLOTAPE) LIMITED • INDUSTRIAL DIVISION
8-10 Paul Street • London • EC2

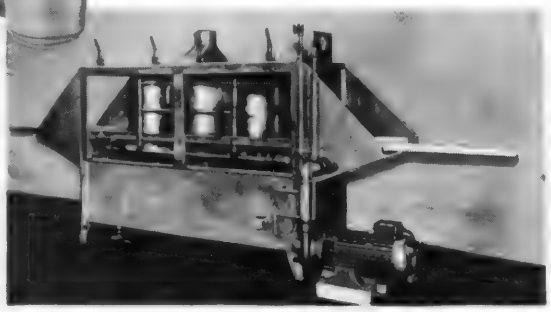
CONTAINERS...
HUNDREDS
OF CONTAINERS

DAWS CREAMERIES (SALTASH) LTD

MUNTON & FISON LTD STOWMARKET

J. LYONS & CO. LTD GREENFORD, MIDDX.

washed by W.H.
...in double-quick time



MILK MARKETING BOARD ASPATRIA, CUMBERLAND

W. H. washing equipment handles containers with amazing speed and thoroughness. Out they come, clean as whistles, completely ready for further service.

W. H. have solved can, churn and container washing problems in many industries, and their wealth of experience is freely at your disposal. If you have a container-washing problem, Wright Hargreaves can supply the answer—either as a standard machine, or as equipment specially tailored to meet your individual requirements.

Hand-fed and Automatic rotary equipment for washing/sterilizing containers at a rate of up to 360 per hour.

Straight-through systems —fully automatic—for washing/sterilizing up to 720 containers of varying sizes per hour. Automatic removal, washing and replacement of lids can be incorporated. Power conveyors with 'Patent' non-friction bends are available to help further speed the operation.

Whatever your problem, we'll be happy to study it and make recommendations.

Wright Hargreaves are the sole agents in England, Scotland and Wales for Silkeborg Plate Heat Exchangers that meet the highest standards of the food industry.

WRIGHT HARGREAVES ENGINEERING CO. LTD.

Office & Works: Brookhouse Lane, Blackburn, Lancs.

Telephone: Blackburn 4195-6. Telegrams: Ritelines, Blackburn.

Also at: Lloyd's Bank Chambers, Newbury, Berks. Tel: Newbury 1063.

Smees W.H.5

Presented with pride!

Seal your pack with "Viskrings" and establish confidence between you and your consumer. YOU can be confident that your bottling will reach the consumer perfect and intact. The CONSUMER will be confident that the contents are genuine and as expected—a fine product, perfectly presented. Seal all stoppered and screw-capped bottles with "Viskrings". There is a "Viskring" to fit every bottle neck, available in a wide range of colours. "Viskrings" can be printed with your brand symbol. Send your container complete with primary closure to us for fitting. We will return it with samples and quotations for any quantity.

- "Viskring" can be applied rapidly by hand—no machinery is necessary.
- They are self-adjusting.
- They prevent the blowing or riding of stoppers.
- They prevent the movement of screw caps once they are tightened.
- They afford protection for branded products and reduce pilferage and evaporation.
- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

for your Sales sake fit "Viskrings"

THE VISCOSE DEVELOPMENT CO LTD

40 CHANCERY LANE, LONDON, W.C.2 Telephone: CHAncery 8111 Telegrams: Viskap Westcent London VC/4

"Nuturally, a better flavour"

If you are as nutty about a "true nut" flavour as our friends above, you will go into raptures when you discover **Reigate Nut flavours.** They are *nut*urally nutty and unmistakeably "true"

There are six to choose from, all deliciously true to type, **Coconut, Hazel Nut, Almond, Walnut, Pistachio** and *(as far as our friends are concerned)* best of all **Nuts & Wine.** You can order them all with perfect confidence We guarantee you will be delighted.

ESTD. 1841 REIGATE BRAND

REIGATE *SERVICE*—

Delivery to all parts of the country every week by our modern fleet of vehicles (*collections of empties also made*).

Sole Manufacturers

WHITE, TOMKINS & COURAGE LTD.

REIGATE SURREY Tel. REIGATE 2242/3

Also at 48 Mark Lane, London, E.C.3. Telephone: Royal 1971
Edmund Street Mills, Liverpool. Telephone: Central 3033
Telephone: Belfast 21633
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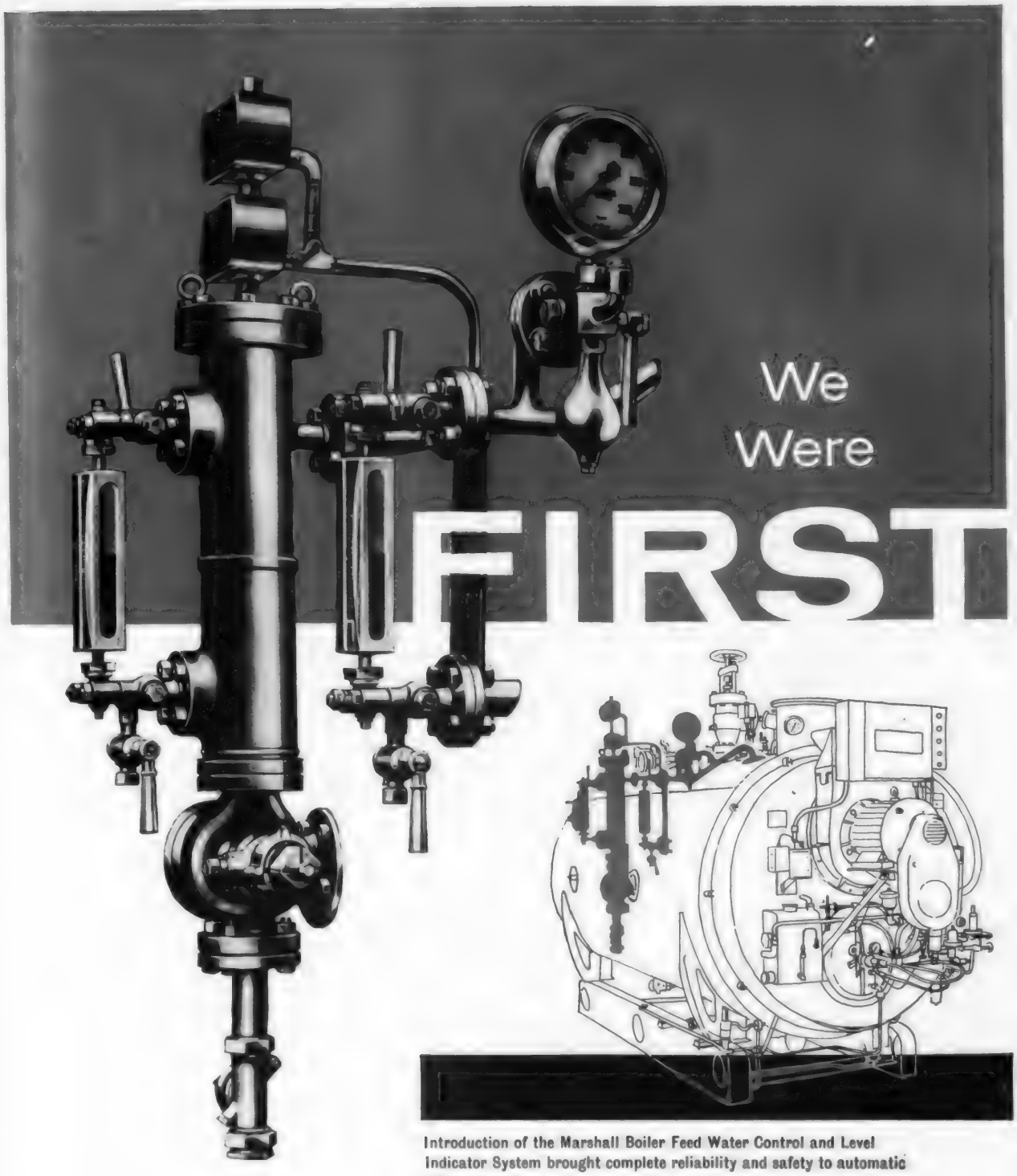
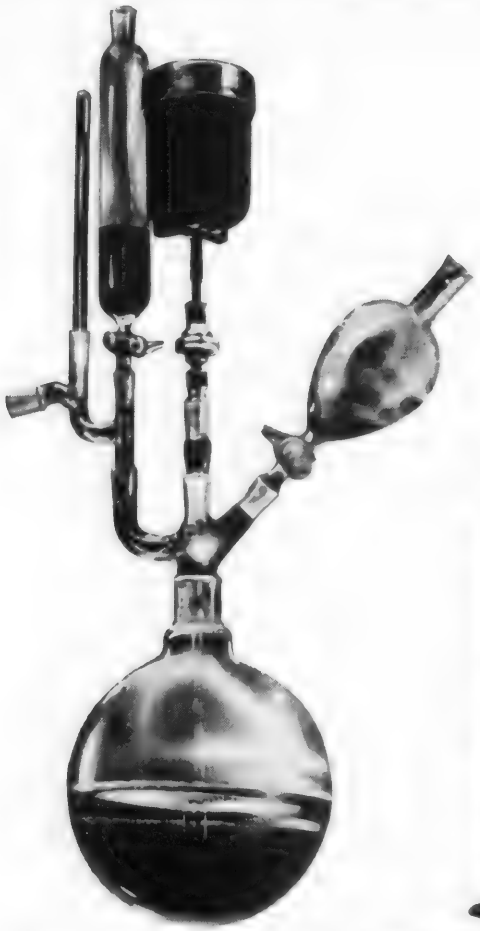


Introduction of the Marshall Boiler Feed Water Control and Level Indicator System brought complete reliability and safety to automatic boiler operation.
This completely foolproof equipment, conceived and developed at Marshall's Gainsborough works, is exclusive to Marshall-built Packaged Boilers.

Thermal Engineering Division

MARSHALL SONS AND CO LTD

Britannia Works · Gainsborough · Lincs · Tel: Gainsborough 2301



when your product begins as a formula...

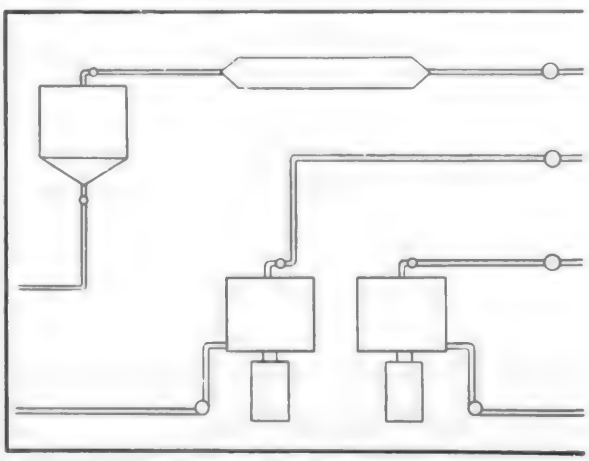
PRODUCTIVITY CALLS

FIRST YOUR FORMULA. It was born in your laboratory out of hard thinking, patient work and hopeful spending. Now it is ready to be turned into productivity and profits. Now speed comes into the picture; speed and volume. It's going to be thousands of gallons now, not pipettes full. Yet it has all got to be as precise in the factory as it was in the laboratory. Clearly a matter of measured batch dispensing and blending; a problem of process control.

THE AGE OF AUTOMATION

This was the picture we at Measurement had in our mind's eye when we were working on the Measurement *Automatic* Liquid Process Control system. Industry, we knew, would want accuracy and speed, and a modern way of applying it. An up-to-the-minute way. In this modern age the bucket is out, mainly because it excludes accuracy. Lifting and trucking must be eliminated because firstly it results in hold-ups, secondly in a waste of labour, and thirdly fatigue with its resulting fall-off in rate of production. Our equipment aims at automatically dispensing the right quantity to the right place at the right time, with all the necessary indication and records made automatically en route. The age of automation inspires sound business men to ask for the right installation for the job and no making shift. Control is the keyword.

"Backed by our years of experience", as the advertisements say (for we have been making liquid meters, pumps and electrical control apparatus for a very long time), we set about meeting this challenge. Years of research finally produced



the instrumentation that offered the flexibility which is essential, and the standardisation which makes the system an economic proposition for industry.

A FLEXIBLE SYSTEM

Today Measurement equipment is used in handling a large number of liquids in food manufacture, paper making, oil blending and chemical mixing processes. Liquids handled range from condensed milk to caustic liquors, and from benzine to beef dripping, and at Measurement Limited there is a catch phrase, "If it flows in a pipeline, then we can meter it".

ADVISORY SERVICE

We offer advice, designs and drawings to cover any complete liquid handling installation to suit any process—*your* own particular process. Given dimensional details, components can be supplied to be fitted into existing panels; otherwise we would supply complete wall-mounted or bench-mounted panels, or console models, tested and ready for installation. Servicing is a thing we regard as a duty at Measurement.

PUNCHED CARD SYSTEM

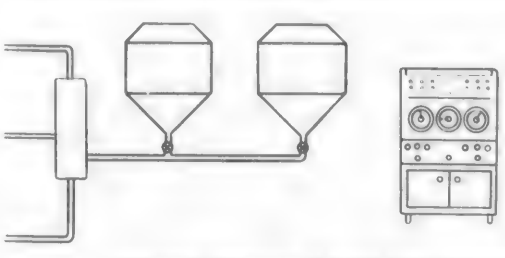
Not only does the Measurement system make Liquid Process Control merely a matter of pressing buttons, now batch delivery and blending can be completely preset and controlled by the punched card system!

SCRIBBANS-KEMP (BAKERIES) LIMITED
Control panel for automatic blending of liquids used in biscuit manufacture at the factory of Scribbans-Kemp (Bakeries) Limited, Grimsby.

FOR MEASUREMENT LIMITED

A WIDE RANGE OF INSTRUMENTS

Whenever a liquid has to be handled, Measurement Limited make equipment to do the job, from indicating a total consumption of a liquid to the automatic dispensing, blending and mixing of various liquids.



Automatic dispensing of liquid from alternative storage tanks to a blending tank and to two rotary mixing machines. The three meters are denoted thus —○, and the three indicators are remotely mounted in a control panel with signal lamps to confirm operation of meters, valves and pumps.

The range of products include:—

(a) Meters made in various metals and moulded materials to enable almost any particle-free liquid to be metered.
(b) Meters with small pointer type indices.
(c) Meters with small direct reading counters.
(d) Meters with resettable direct reading numeral rollers.
(e) Meters with remote reading magnetic counters.
(f) Meters with horizontal or vertical large dial instruments having resettable pointers.
(g) Meters with automatic presettable indicators that enable the operation of valves, pumps and warning devices.
(h) Complete panels with auto preset indicators, signal lamps and push buttons for wall mounting or free standing.
(i) Schemes involving a number of meters dispensing liquids to one outlet.
(j) Schemes where a number of liquids are dispensed through one meter.
(k) Automatic actuation of metering equipment by photo-electric cell or contact operating devices.
(l) Complete panels incorporating mimic diagrams.
(m) Complete auto preset equipment that could be preset by a punched card reader unit.

★ *You may be tempted to tear out this advertisement for reference. Well, it's always a pity to spoil a book: get your Secretary to drop us a card and we'll gladly send you a reprint of these pages. A letter with more detailed requests will, of course, receive more detailed attention. Write to:—*

MEASUREMENT LIMITED
TAMESIDE WORKS DOBCROSS, NR. OLDHAM, LANCS.
Telephone: Delph 424 (5 lines) *Telegrams:* Supermeter Dobcross
MEASUREMENT ENGINEERING LIMITED P.O. Box 2305, Wellington C.I.
PARKINSON COWAN (S.A.) (Pty.) Ltd. P.O. Box 1113, Johannesburg
Export Enquiries to: Parkinson Cowan Group Exports Ltd., Terminal House, Grosvenor Gardens, London S.W.1.
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COMMER leads again!

Van with sliding doors, or hinged doors with or without additional side door.

An entirely NEW and brilliantly VERSATILE range

of ¾ ton Goods & Passenger Vehicles

with PETROL OR DIESEL power

* **First light vehicle range to offer a choice of fully-proved petrol or diesel power units, both easily accessible.**
* **Extra large loadspace of 210 cu. ft.**—Unmatched by any other Van in its class.
* **Full-forward control** 3-seat driver's compartment with panoramic windscreen.
* **Easy loading and unloading**—Wide doors at side and rear.
* **Unitary all-steel construction with undersealed bodies** gives extra strength and durability.
* **Independent front suspension** ensures firm road-holding.
* **Hypoid rear axle** for longer engine life and quieter running.
* **'Easy-ride' rear springing**—Extra long underslung leaf springs provide a steady, comfortable ride.
* **Nineteen basic models** including vans, light buses, pick-up, dropsider, mobile shop, bottle float, caravan, etc.

BACKED BY ROOTES COUNTRY-WIDE PARTS AND SERVICE ORGANISATION.

Never has there been such value as this in **ECONOMY,** *in* **LOOKS,** *in* **LOAD SPACE**

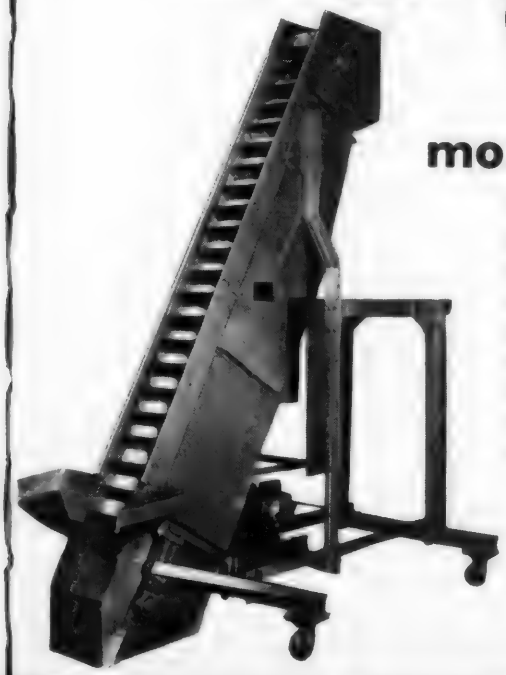
ROOTES PRODUCTS — BUILT STRONGER TO LAST LONGER!

COMMER CARS LIMITED LUTON BEDFORDSHIRE EXPORT DIVISION: ROOTES LIMITED DEVONSHIRE HOUSE PICCADILLY LONDON W.1

JENNERS *for*
Mechanical Handling Systems

mobile conveyors

for maximum efficiency and carrying capacity. Jenner Mobile Conveyors do the work of many men, yet even the largest can be handled with ease by one man. These powerful Jenner Mobile Conveyors are fitted with twin hydraulic rams, each capable of lifting 1½ tons. Using ordinary belts with slats at intervals, loads can be carried up to 45°, and even heavier loads on a chain and slat assembly. The streamlined boom unit is available in lengths up to 16 ft.



mobile elevators

They may be mounted on a rail track to work with a bank of machines in operations synchronised by Jenner automatic control, or they may be entirely mobile. Every Jenner Mobile Elevator is designed for easy cleaning, and pick-ups can be of steel, aluminium, wood or plastic to suit different processes.

CUSTOM BUILT EQUIPMENT
ELEVATORS
SPIRAL CHUTES
FREIGHT LIFTS
SWING TRAY ELEVATORS
CONVEYORS—
BELT · ROLLER
CHAIN & SLAT
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A. & C. JENNER LTD · CLARENDON WORKS · MITCHAM · SURREY

Mitcham 2281-4. Northern Area: C. W. Folkes. Tel: Wilmslow 2167

5 OF THE BEST...

These five materials were developed to meet customers' special requirements.

LET OUR TECHNICAL SALES DEPARTMENT HELP YOU!

Phone for our representative to call and see you.

FISHER'S FOILS

FISHER'S FOILS LTD. EXHIBITION GROUNDS, WEMBLEY, MIDDLESEX, ENGLAND

TELEPHONE: WEMBLEY 6011 *GRAMS: LIOFNIT WEMBLEY*

with TRI-PEDAL

iron paving units

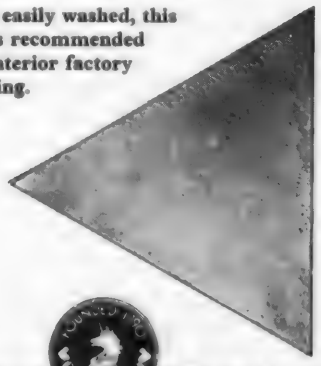
No dust, no odour, rapid drainage and easy cleaning makes TRI-PEDAL the ideal flooring for food factories. It is impervious to oils, greases and food acids, and it will not crack or craze. The three-point support in each unit ensures a level and stable flooring with absolute safety for foot traffic and trucking.

STRIATED

An ideal non-slip paving for interior use, approach roads and loading yards.

PLANE-SURFACED

Very easily washed, this tile is recommended for interior factory flooring.



BUTTERLEY

THE BUTTERLEY COMPANY LIMITED · RIPLEY · DERBY · ENGLAND

Tel: RIPLEY 411 (9 lines) London Office: 9 UPPER BELGRAVE ST. SW1 Tel: SLOANE 0172/3

TP. 21

No more for me to do...

With I.C.I.'s air-discharge vehicles a bulk load of Pure Dried Vacuum Salt virtually delivers itself. Our driver simply turns a valve and 7 tons of factory-fresh salt is pumped into your silo in thirty minutes. No package costs, no handling costs and no risk of contamination.

...I.C.I. Salt delivers itself

Send for free copies of the booklet "Salt by Pipeline"

Imperial Chemical Industries Ltd., London, S.W.1.

ICI

BS.134

CONDER *CLEARSPAN*

SLASHES BUILDING COSTS—OUTDATES TRADITIONAL CONSTRUCTION

Warehouse 110 ft. span, Gresham & Craven Ltd., Manchester. *Architects:- Francis Jones & Sons, Manchester.*

CLEARSPAN Buildings have established a brilliant new conception of Industrial Building Design.

Hitherto "Standard" type buildings have been largely confined to the "Shed" variety; and their use limited accordingly.

Now CLEARSPAN brings all the great advantages of Standard Construction to a very wide range of Industrial Buildings. CLEARSPAN sets a new standard of design and efficiency.

- Spans 25 ft. to 150 ft.
- Roof Slopes 12°-17°-22°
- Cranes up to 50 tons.
- Virtually maintenance free.

(Variations to order)

Brochure with 32 pages of facts, drawings and photographs sent on request.

CLEARSPAN BUILDINGS are used by many leading Industrial concerns including:—

Atomic Energy Commission.
British European Airways Ltd.
De Havilland Engine Co.
Esso Petroleum Co. Ltd.
Imperial Chemical Industries Ltd.
Imperial Tobacco Co. Ltd.
J. Lyons & Co. Ltd.
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National Coal Board.
Shell Mex & B.P. Ltd.
Southern Electricity Board.
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P.3571/2210

Designers! Is this on your shelf yet?

For the designer who knows about Glacier DRY Bearings — uses them — and points out years afterwards how right he was — it is now possible to save not only cost and maintenance in mechanical assemblies (to say nothing of oil), but designer's time and trouble, too!

Glacier Designer's Handbook No. 2 is out now!

This new handbook makes the drawing of most dry bearings quite unnecessary: all you need do is quote the Part number. In addition it provides COMPLETE TECHNICAL DATA on properties dimensions and tolerances for DU and DQ Dry Bearings and Materials — as well as on DG and DL process treatments.

THIS BOOK SHOULD BE IN THE HANDS OF EVERY DRAUGHTSMAN!

FREE OFFER:
We will send to any company, on receipt of a request from an official of the company, a copy of the Glacier DESIGNER'S HANDBOOK No. 2 for each of their draughtsmen.

We will also send a copy to any individual draughtsman who writes to us on his company's letterheading.

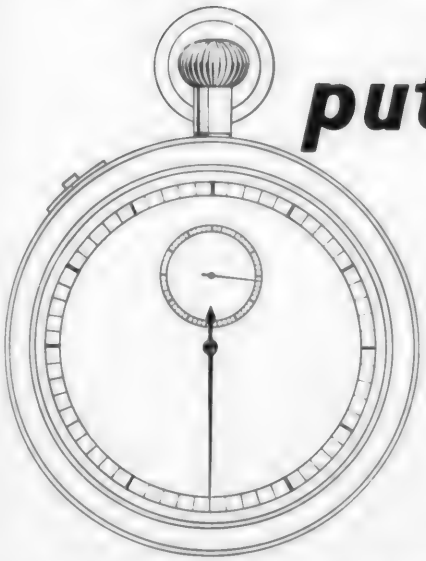
Write *now* to:

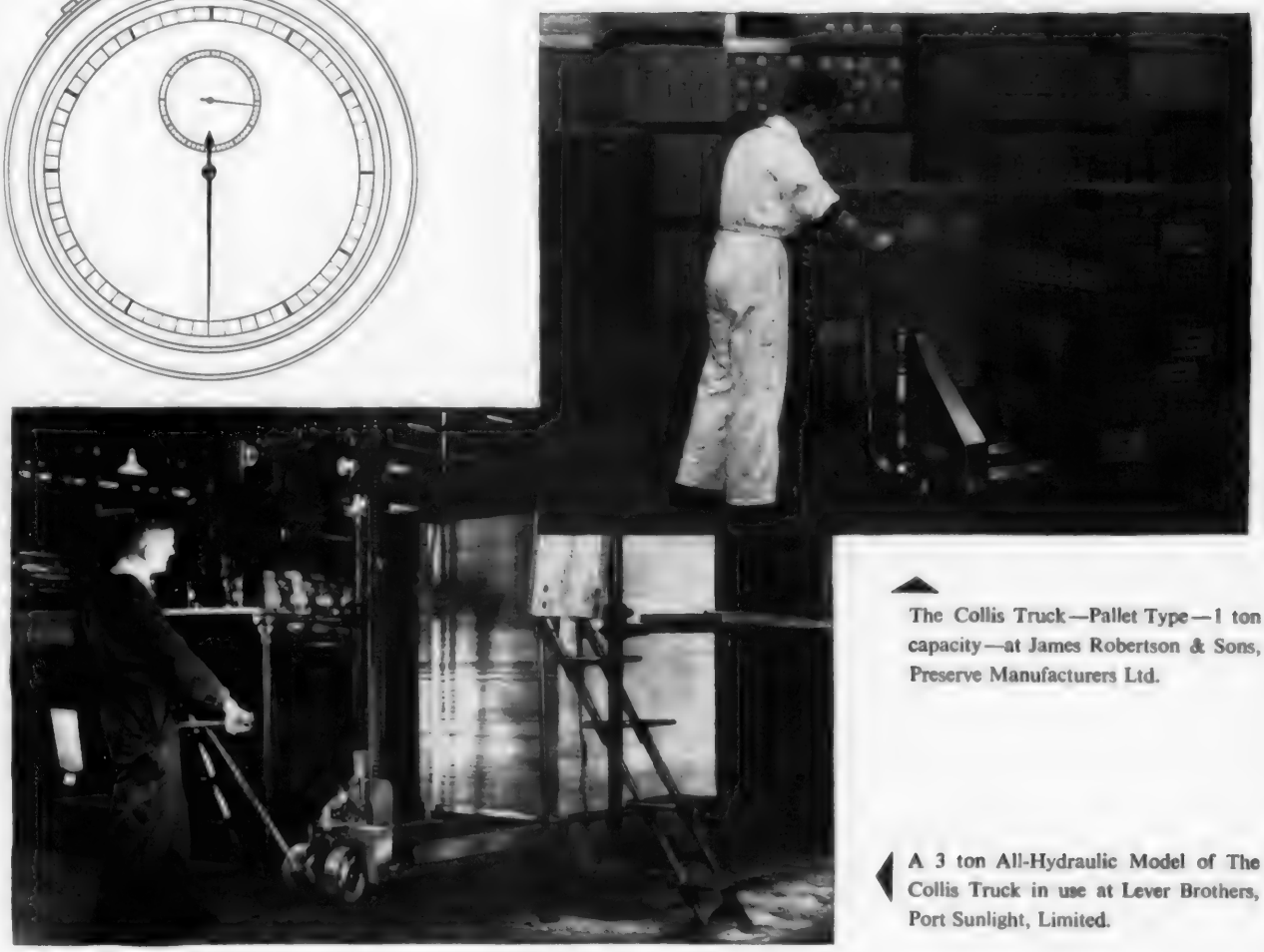
GLACIER

THE GLACIER METAL COMPANY LTD · Dept. 7 · ALPERTON · WEMBLEY · MIDDLESEX

The Collis Truck

puts TIME on your side





The Collis Truck—Pallet Type—1 ton capacity—at James Robertson & Sons, Preserve Manufacturers Ltd.

A 3 ton All-Hydraulic Model of The Collis Truck in use at Lever Brothers, Port Sunlight, Limited.

The Collis Truck *-it makes the floor move!*

In workshops, warehouses, stores, etc., The Collis Truck with its quick get-away, free-running movement and controlled lowering, enables the operator to get **more done with less effort.**

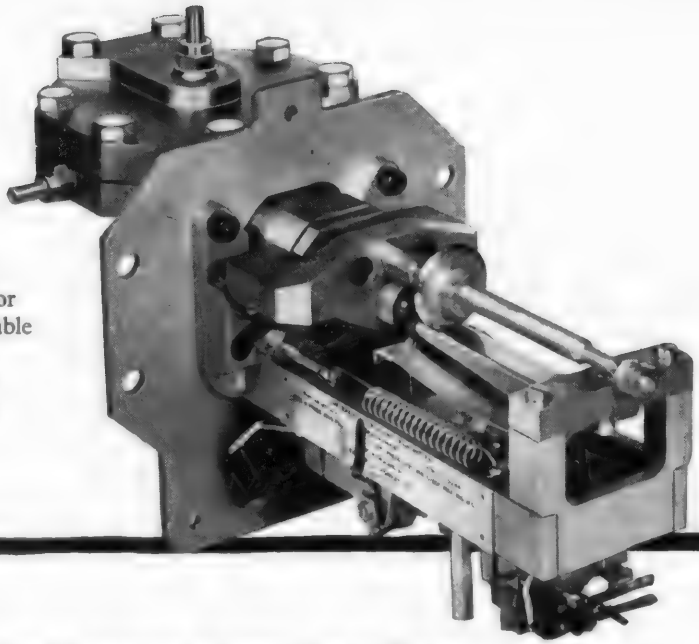
Please write or 'phone for literature or for our Technical Representative to call—**and see what Collis can do for you.**

In the Service of Industry since 1867

J. Collis & Sons, Ltd.

MECHANICAL HANDLING ENGINEERS

Dept. E.12, Regent Square, Gray's Inn Road, London, W.C.1 **Tel: TERminus 6141**



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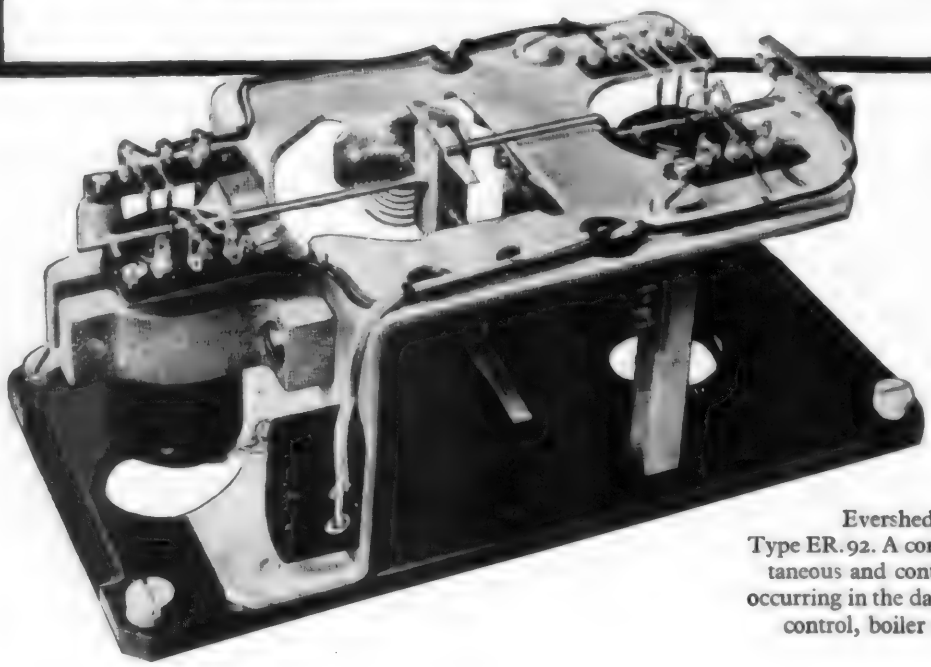

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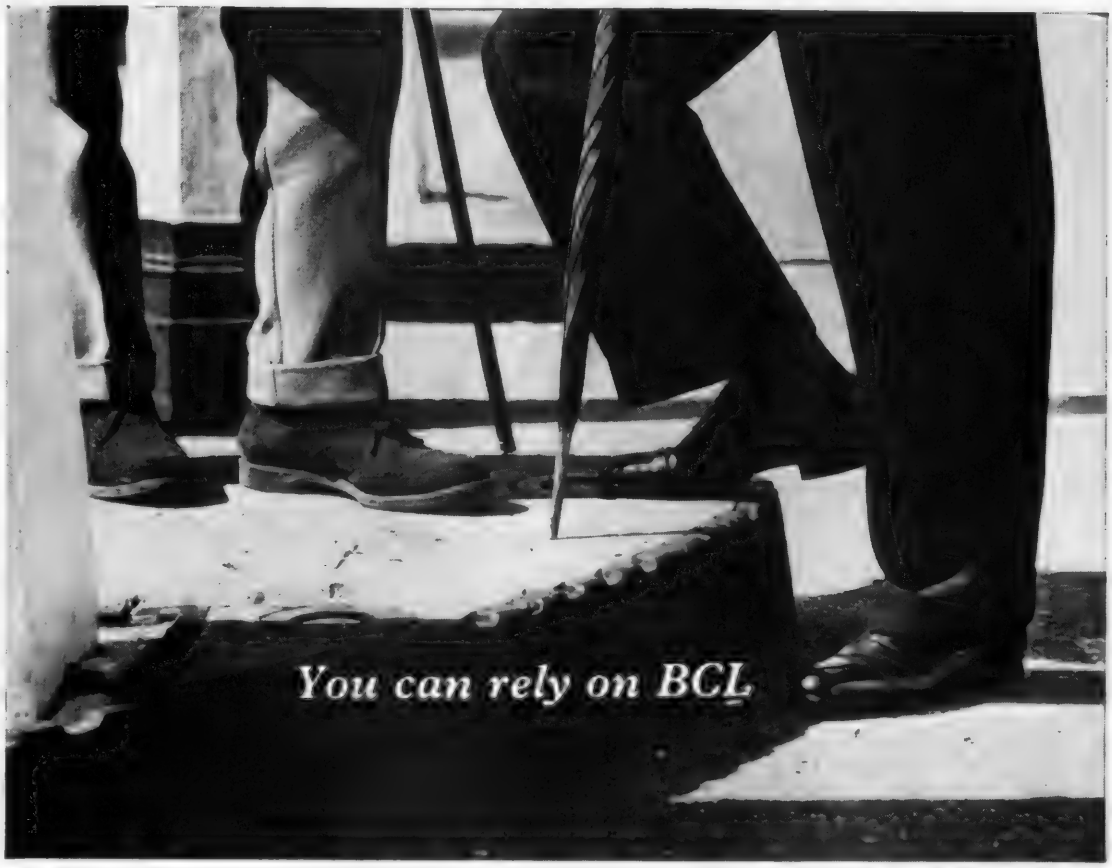

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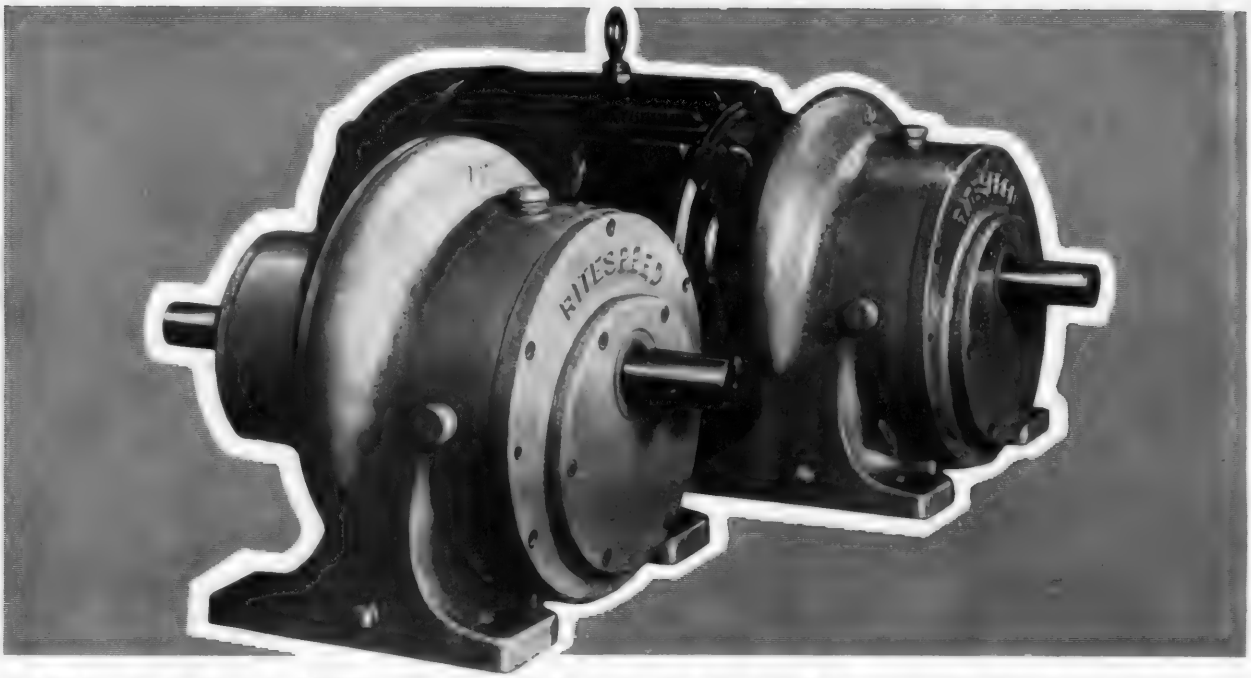

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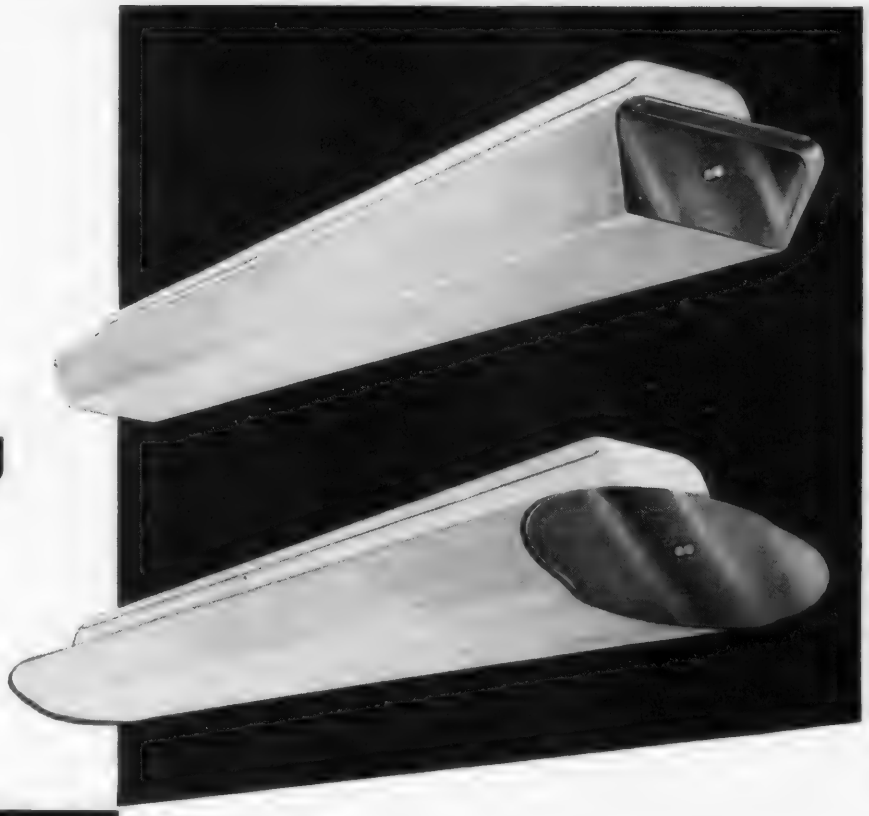

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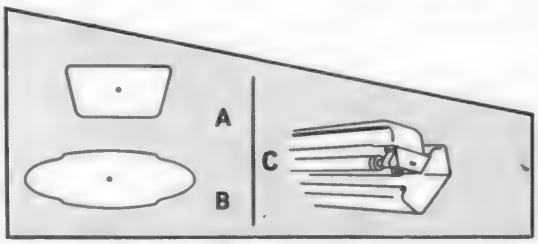

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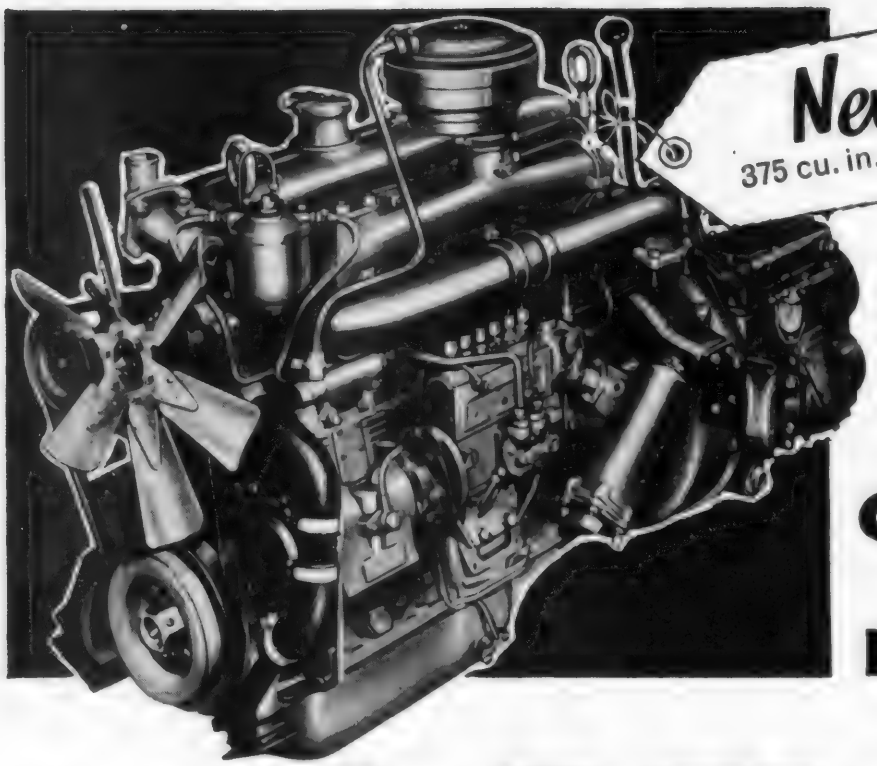

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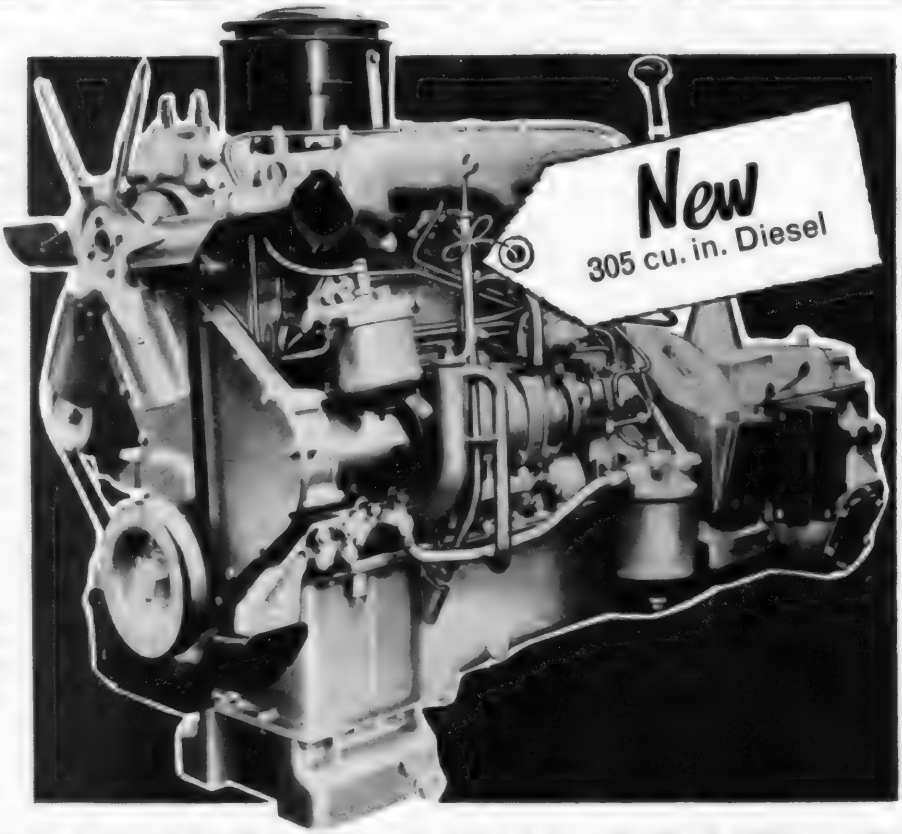

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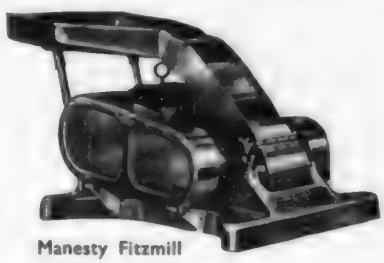

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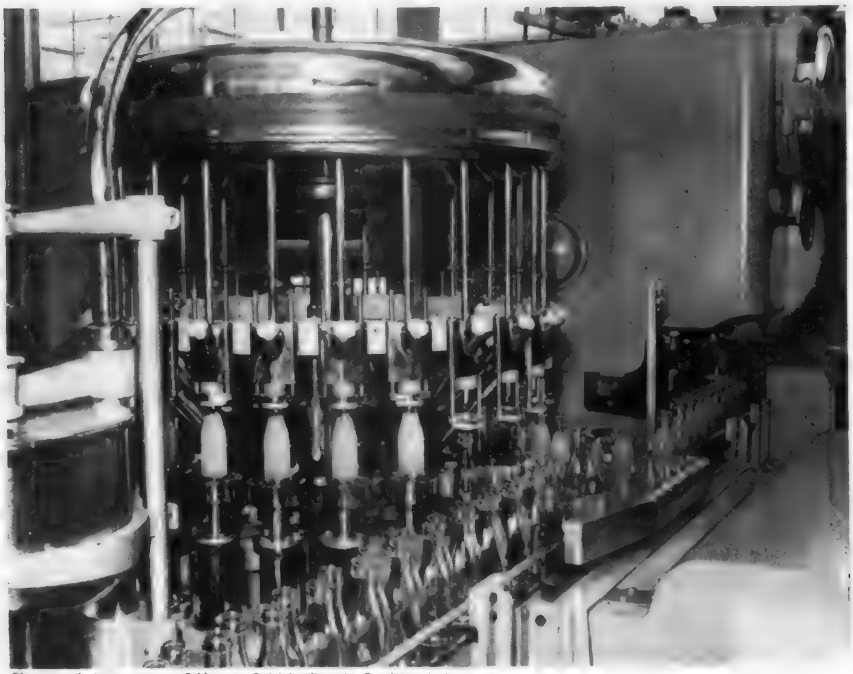

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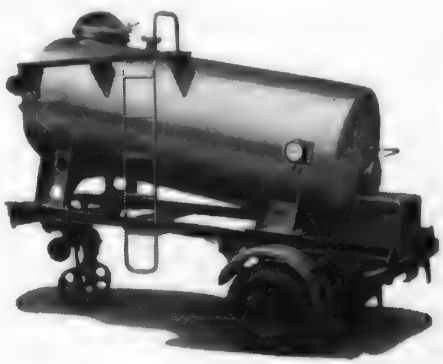

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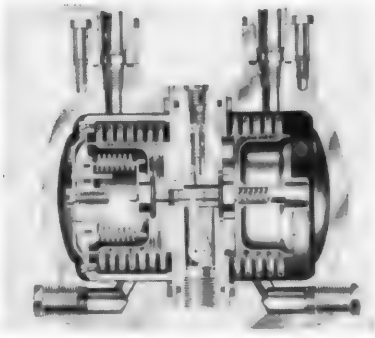

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FOOD MANUFACTURE

Volume XXXV. Number 2 Editor: Anthony Woollen, B.Sc., A.R.C.S., A.R.I.C. February 1, 1960

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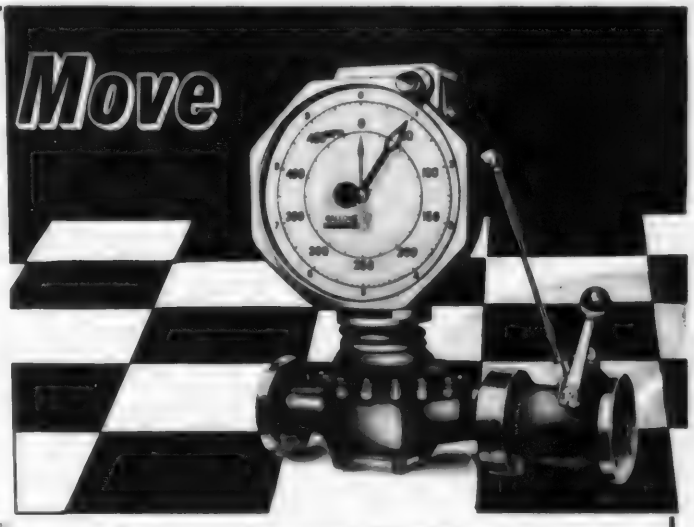

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FOOD MANUFACTURE

Vol. XXXV, No. 2 February 1, 1960

Fats and heart disease

Do animal fats cause heart disease? Transatlantic literature has been referring to the situation as a "crisis" for fat-containing foods. Is the situation as bad as this?

This is not a medical journal, and we are not entirely at ease when discussing clinical matters. But for some time in North America, certain aspects of fat nutrition have been exploited—"distorted" would be a better term—for private gain and the beginnings of this are now being seen over here. Very briefly, the situation is that certain interests are insinuating, firstly, that the consumption of some types of fats, particularly those of animal origin, is bound to produce atherosclerosis (a fatty degeneration of the arteries) leading in due course to coronary failure, and secondly, that this process of degeneration can be avoided, or halted, by consuming only certain unsaturated fats of vegetable origin.

The scientific literature dealing with atherosclerosis is so enormous and complex that any advertiser will always be able to quote an apparently authoritative opinion in support of his campaign. Our own survey, undertaken with the object of obtaining a balanced picture, has yielded the following results.

Atheromatous changes in the coronary arteries may be due to a number of causes, of which the ingestion of too much, or of the wrong kind, of fat is only one. Most human beings, in any case, may be affected in slight degree by atherosclerosis without being robbed of the chance of living to a ripe old age. So far, the best available pointer towards the *likelihood* of serious coronary trouble in later life is the continued prevalance of a high cholesterol level in the blood plasma. As, however, this may be due to a variety of causes, the danger of placing too much reliance on advertised dietary cures is not difficult to appreciate.

On the other hand, it does appear that a connection exists between fat consumption, atherosclerosis and coronary impairment. Systematic studies of the health and diet of a number of populations in different parts of the world have shown that populations with a low-fat and cereal-cum-fruit diet carry relatively little cholesterol in their blood (*e.g.* the Bantus and Javanese with cholesterol levels of the order of 120 mg./ml), and are hardly touched by coronary complications; whereas prosperous Western populations whose food and fat consumption is habitually greater, have a much higher cholesterol level, reaching a maximum in the case of the North American adult (about 250 mg./ml.). Furthermore, this quantitative difference in fat consumption seems to be paralleled by qualitative differences, in that the low-fat diets of the more primitive peoples usually include vegetable fats, whereas in the much richer diets of the Western peoples animal fats predominate.

Overeating a greater hazard

WHILE the body's requirements of essential fatty-acids are more likely to be satisfied by means of the liquid plant-fats, it is less certain whether or not the other differences between animal and vegetable fats amount to very much. Certainly, neither of the advertisers' main arguments previously mentioned can be accepted unconditionally.

An unprejudiced survey of various scientific opinions shows that much depends both on the nature and the *amount* of the food consumed. There seems to be a close statistical link between coronary disease and dietary affluence. By not indulging in habitual overeating, the danger of atherosclerosis and a host of other troubles can be greatly reduced.

Exactly the same considerations apply with regard to fat consumption alone. In a sober, moderate diet, the presence of some animal fat does no harm, whereas the habitual ingestion of excessive amounts of vegetable fats may lead to complications.

There is, of course, no reason why corn oil or similar liquid plant-fat should not be included in the diet, but it must never be forgotten that some of the most valuable foods (*e.g.* milk, eggs and meat) all contain animal fats. To cut these vital foods entirely out of the diet would be disastrous. We know that among underfed peoples there is a lower incidence of coronary impairment, but nobody in his right mind would advocate malnutrition as an antidote to atherosclerosis. To do so would be to open the road to widespread anæmia and tuberculosis.

The only intelligent course to take is to adopt rational feeding. We do not accept advertisers' contentions—actual or implied—that we live under the

constant threat of atheromatous coronary failure. For every such case, there are many thousands quite unaffected, and if the advice of doctors and nutritionists were to be followed, the incidence of this disease would be substantially reduced.

Eat less and take more exercise is the old-fashioned remedy which commonsense and experience still enjoin. You do not have to live on a sick man's diet to be healthy and long-lived.

Can food be too refined?

REGULARLY once a year the school medical adviser saw the boys individually. Each boy in turn was called from class (and if a Latin class, so much the better!) to spend a delightful fifteen minutes sampling the unaccustomed luxury of the Head's easy chair. The benign old doctor's first question was invariably "How are your bowels?" and as he rolled the inflatable bandage of a sphygmomanometer round our upper arm he lectured with gentle severity on the supreme importance of regular daily motions. We were too interested in the jerky ascent of the mercury in the tube as he squeezed the rubber bulb to pay much attention; we knew too, from previous experience, that his concluding remarks always turned to the subject of cricket, which seemed of much greater practical importance. Small wonder that we left his amiable presence and returned to class with genuine regret.

That aged doctor has long since passed on, but the seed he sowed has rooted, for we have remained convinced that one of the foundations of health is regular bowel movement. An old-fashioned view? Perhaps. But the prevalence of constipation and of medicines for its relief indicate that this malaise is more bound up with our way of life than we would like to think.

The intricacy of the human body is such that if one function is deficient all the rest can suffer. If the mechanism of waste elimination is not working properly, all manner of ills can ensue, from mere mild discomfort to major disorders. If the human body is regarded in a detached way as a machine, the conclusion is inescapable that it is fundamentally designed to do rougher work and to use rougher fuel than most business executives, for example, are accustomed to.

Does this mean that the soft living of prosperity is bad for health? Medical evidence is insufficient to enable a positive answer to be given to this much discussed question, but general trends are observable and in line with commonsense. We see that people who rarely take exercise and who travel everywhere in limousines tend to put on weight. We know that constipation is common even among people who take a reasonable amount of exercise and who do not live particularly luxuriously. Do our modern processed foods contain insufficient of the roughage essential for the proper functioning of the body's elimination processes? Cabbage, for example, bought fresh from the greengrocer and prepared by the housewife at the kitchen sink contains more stalk and indigestible matter than quick frozen cabbage obtained from the freeze cabinet. Processed and refined foods generally contain less roughage than the foods most people were eating, say, twenty years ago.

Nutritionists take due account of the body's need for roughage, but among people not so well versed in physiology, there is a tendency when the body's nutritional requirements are under discussion for the important factor of roughage to be overlooked. Can food refinement be carried too far?

The hazards of eating

IF regular elimination was one prophylactic measure emphasised by our forebears perhaps rather more than is done today, another was thorough mastication. We were reminded of this by a letter in the *British Medical Journal* reporting cases of obstruction to the bowels by large lumps of undigested food. These cases had to be treated surgically. One was a woman who had eaten an orange "rather hurriedly" with the result that three whole segments had become well and truly stuck in her small intestine. Three other cases involved oranges (one died, although it must be admitted that this man, who wore dentures, wore them for appearance sake only, when walking out and not while eating). The remaining case mentioned was laid low by an outsize meal of cod-roe and chips.

"We think that this kind of obstruction can become a preventable disease" say the authors of one of the letters. The moral seems to be that inadequate mastication, of citrus fruits in particular and of food in general, is a potential danger.

Banging the big drum

NO subjects evoke so many pontifical pronouncements from dogmatists, faddists, cranks and experts as the twin topics of nutrition and population. We would have thought that the two subjects were distinct, but as they seem to be increasingly coupled until now in the public mind they seem almost synonymous, we have perforce to follow the fashion and deal with them together.

To judge by the gloomy prognostigations of most of the experts, the world is faced with the two-headed spectre of starvation and overpopulation. It is now 150 years since Thomas Malthus proposed his famous thesis that population would outstrip the available food supply; in that time we have seen both a

large increase in the population of the world and the betterment of the living conditions of most of the people in it. "Two-thirds of the world's peoples are hungry." How often have we heard this repeated *ad nauseam*; we are almost beginning to believe it! But who started this? Experts quote figures with glib facility, but what authority do they give for them? As far as we can judge, the man responsible for setting the fashion was the former Director-General of F.A.O., Lord Boyd Orr. As his statements fitted the theories of numerous pseudo-philosophers, no one has bothered to question them or dare to march out of step with those who uncritically follow his lead.

As we have said on previous occasions, the problem facing the hungry nations is more one of poverty than shortage of food. There is enough food in the world to feed adequately everyone in it provided the money is there to buy it. We challenge anybody to disprove that statement. But if so many of the world's peoples are hungry, how can they go on reproducing themselves so fast? It does not make sense.

What about the overcrowding scare? One of the fallacies so prone to entrap even scientifically minded people is the extension of present trends indefinitely into the future. How do we know that the world's population in the year 2060 will be umpteen billion? Who are we, mere ants in an unfathomable cosmos, who cannot even control the congestion in our city streets, to dare to talk about "controlling" the world's population? As well might Canute try to control the tide.

And now we have Professor Medawar, in the final Reith lecture, saying that Nature does not know best, that its story is one of "waste, makeshift, compromise and blunder." *O tempora, O mores!* The world is truly coming to an end, the stars are falling upon us. At least, they would be if we listened to such experts. But we believe the future is very much brighter. Man is endowed with intelligence and reason to equip him for tackling the problems of living. One of those problems is how to provide more food (and wealth) for our increasing numbers. The problem is solvable, but to attempt to solve it by indiscriminative birth prevention is a philosophy of despair, akin to treating a cut finger by cutting it off.

Too many people are banging the birth control drum and making a big noise; before we become completely deafened by the din, let us first apply the more hopeful and positive measures placed at our disposal by Science.

Even the elimination of some of the waste, inefficiency and ineptitude which at present hamper the production and distribution of the world's food would go a long way towards solving the problem.

Irrigating the Sahara

ONE project dear to our heart which would increase world food supplies is to make the Sahara flower. We learn from our associate journal *World Crops* that this seemingly fantastic idea may not be so far-fetched as it sounds. Some three million square miles of arid Sahara desert, and lesser arid zones in Spain, Israel and other rocky countries, may be made productive during the next 50 years or so if the chance discovery of a British chemical engineer is applied on a large scale.

This man applied vermiculite to a bare sandy area of his garden at Bagshot, Surrey, and within a few months a firm growth of grass had been established. Many gardeners, of course, are familiar with this mica-like material for forming roots. It is often used in soil or sand to give a clean medium for root formation and to hold moisture and air. Its particular virtue is that it holds water tenaciously, even under the hot sun.

The first essential in desert irrigation is to make the sand hold water, and it is said that this could be achieved by applying vermiculite at the rate of, say, 9 tons per acre. For the treatment of a sizeable area of desert an enormous quantity would be required, but supplies of vermiculite in the Transvaal are plentiful and could be distributed by aeroplane or helicopter.

The next task is to provide water, and here the invention of a Russian Jew who now lives in Israel may come in useful. His invention is claimed to produce fresh water from sea water by a freezing process at one-third the cost of any other comparable method. So promising is this process that one million dollars is to be spent on two plants on the Gulf of Akaba, the money to be contributed equally by the Government of Israel and by the American firm who will exploit the process. The combined outputs of the two plants will be half a million gallons of fresh water a day for a daily cost of £70. By 1965 the firm hope to have plants with a daily capacity of 1,000 million gallons.

The third stage is to plant a coarse grass to hold the sand and prevent it being blown away. In time a rudimentary soil containing humus will be formed and a green cover will be established. The process may be assisted by pinning down large perforated sheets of polythene or PVC to prevent the sand being lifted by winds; the perforations are to permit aeration of the soil and to allow the grass to come through.

The operation will take longer than the lifetimes of most now living, and the cost will be astronomical. But the large resources of the oil companies now working in the desert must be tapped if necessary. Sooner or later Governments must realise that the

sums now spent apparently without limit on nuclear weapons and the questionable benefits of space travel must be diverted to more fundamental tasks if mankind is to be fed.

Dangerous sprays

IN spite of the numerous and increasing food regulations designed to protect the public from contaminated and harmful foods and additives, we still hear of loopholes which nullify the good results of these laws. Part of the trouble is that technology is advancing at such a rapid rate that legislation cannot keep up.

The latest example, which we discovered in the pages of the *South Wales Voice*, concerns a cargo of apples imported from the Lebanon which had been contaminated with toxic insecticidal sprays in the country of origin. The apples were actually on their way to shops in the Swansea district when the danger was discovered and the apples impounded by the health authorities. A bread poisoning scare two years ago has caused the Pontardawe Council Health Department to be especially vigilant ever since, and it is thanks to them that the contaminated apples were discovered.

According to Mr. Ieuan Lewis, Pontardawe Council chief public health officer, the main trouble is that sprays containing new chemicals poisonous to humans are being manufactured and put into regular use without adequate trial. We learn that Mr. John Hall, M.P. for Harborough, Leicester, is endeavouring to introduce a private members' bill which will seek to impose safeguards and restrictions on the use of insecticidal sprays; we hope that this will be made to cover produce imported from abroad.

A shameful business

How many beans make five? The answer in Italy, if bottles of olive oil are substituted for beans, would seem to be 2½. Always a basic ingredient in Italian cooking, especially in the south, olive oil is produced domestically at the rate of about 250,000 tons a year. No considerable amount is imported, yet home consumption is about twice as much.

One might justifiably suspect that in Italy olive oil is "extended" with other things on a large scale, and this indeed is the answer. Large quantities of animal fats are imported (180,000 tons in 1958), processed and mixed with olive oil. Until recently the mixture could be sold legally as "olive oil," but we are glad to note that the Italian Government has now banned this fraudulent practice.

Widespread adulteration of food is carried on in Italy, according to a recent report in *The Times*, under cover of inadequate legislation and obsolete testing techniques. During the first 10 months of 1959, 9·73% of all the samples of food analysed in Government laboratories had been found to be adulterated. As a result of a press campaign drawing attention to these malpractices, the sales of a number of popular products have fallen and exports have been reduced.

Adulteration of food for private profit is a despicable practice, not only for the more obvious reasons but also because the machinations of a few inevitably draw unjust suspicion on the many honest manufacturers who do not stoop so low.

Hygiene and the British pub

"DILUTE SEWAGE" is the term applied to washing-up water in public houses by a bacteriologist writing in the *Guardian*. In spite of the great sums spent on the renovation of these establishments, he says, one feature, the washing of glasses, remains mediæval.

The principal reason for this is, apparently, the British drinker's demand for a dry, shining glass. To achieve this result, the barman rinses the glasses in water, which quickly arrives at the condition already denoted. He then polishes the glasses ostentatiously with the maximum of handling, ensuring that any bacterial deficiencies of the rinse water are made up from the bacterial populations of his hands and cloth. Occasionally he coughs discreetly into his hands to make doubly sure. Even if the rinse water contained disinfectant, it would need to be of extraordinary potency to cope with such conditions.

The New China, we are told, pursues hygiene to extraordinary lengths. We have even seen a photograph of an ice cream vendor in Peking wearing a surgical face mask. We do not think the British barman will ever be persuaded to wear surgical gloves even in the interests of science, neither do we think it desirable. Are we talking heresy when we say that a little dirt, just a very little, is a good thing? What would the world be like without a few tame bacteria, just sufficient to remind people that they still exist? China, it is said, has eradicated the house fly. From all accounts, that ancient land is making sterility a fetish, hardly surprising when one considers the sterility of the philosophy which has it in its grip.

The operating theatre is a very clean place, perhaps the cleanest place on earth. But no one in his right mind dreams of living in it. What is this world becoming, a valley of flowers and meadows, with rivers meandering along muddy banks, and the laughter of children with dirty faces, or a scrubbed, sanitised mausoleum of chromium and gleaming tiles, a speckless, dustless shrine of hygiene where people die of boredom because things are so sanitary and ordered that nothing unexpected ever happens?

Lorries outside Keiller's Maryfield factory loaded with goods for export.

Keiller's of Dundee

How marmalade and confectionery are made by this 160 year old enterprise.

Albert Square, Dundee, has been the site of Keiller's factory since it was founded in 1797. In recent years an additional new factory has been built at Maryfield, where marmalade manufacture is now concentrated. FOOD MANUFACTURE recently visited these two factories and saw how traditional methods are blended with modern technology.

MARMALADE is usually the first thing that comes to mind whenever the name Keiller is mentioned, and this is as it should be, because Mrs. Keiller, so the firm say, was the first person to make orange marmalade as we know it today.

John Keiller and his wife lived in Dundee, and tradition informs us that he was trading as a grocer in that city. The arrival of a ship containing bitter Seville oranges was too great an attraction for his commercial instincts to resist, and he bought the cargo on speculation. Young Mrs. Keiller had been taught by her mother how to make a product called "marmalet" which, from its Spanish derivation *marmelo* meaning a quince, would today have undoubtedly been called quince jelly. Knowing how popular her marmalet was, Mrs. Keiller decided to boil the Seville oranges with sugar in the same way as she did the quinces, and, as simply as this, the first orange marmalade had been made.

The favourable reception which this novel conserve got in and around Dundee surprised even the Keiller family, and before long Mrs. Keiller and her son James decided to put her invention to a commercial test. The firm of James Keiller and Son was therefore founded in 1797, and from the first their hopes and ambitions were realised, the fame of the new product in its distinctive white pot spreading beyond the British Isles to all parts of the world.

The first factory was built on the site of the present one in Albert Square in the heart of Dundee, but this was naturally a very modest affair compared with the very large building which stands there today. The early days were devoted mainly to marmalade, and in the search for a perfect product, James Keiller's younger brother, Wedderspoon, invented a machine for cutting the peel into strips.

Factory development

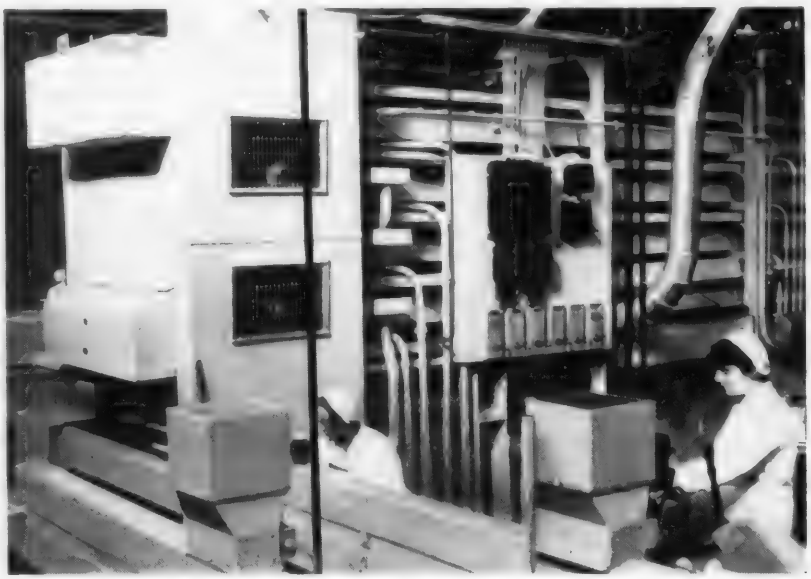
In a comparatively short time a thriving export business had been developed, In 1846, however, the company had to contend with a new and serious problem when a duty on sugar was imposed, and to overcome this, manufacture was commenced in Guernsey. This policy worked very well because

Jar filling and capping; the sterilising unit can be seen on the right (Maryfield).

the grandsons of the original Mrs. Keiller, Alexander and William, looked after a factory each, the former in Dundee and the latter in Guernsey.

These arrangements continued until 1874, when the sugar duty was repealed and it was possible to transfer manufacture to London. A new factory, named Tay Wharf, was erected on the banks of the Thames at Silvertown in 1879 with William Keiller in control. Great progress was made during the latter half of the nineteenth century, but three serious fires destroyed much of the Dundee factory in 1860 and 1900 and Tay Wharf in 1899. During rebuilding, the opportunity was taken to modernise the installations in both factories.

Nothing further disturbed the steady progress of the Keiller business until September, 1940, when during the first large-scale raid on London the Silvertown factory, covering almost 7 acres, was completely destroyed. Although since the end of the war the gradual rebuilding of this factory has been going on, it was decided to increase greatly the manufacturing capacity in Dundee, and an entirely new factory on a 7½ acre site at Maryfield, on the outskirts of the city, has been built. Enlargement and complete modernisation of the Albert Square factory has also been carried out.



Jar sterilising unit in the marmalade department (Maryfield).

Maryfield factory

This factory is situated in the northern part of the city. It has its own railway siding for receiving materials and despatching finished products. Here the production of Dundee Marmalade, and jelly marmalades—Orange Chip and Lemon Chip—are now carried out on a large scale; smaller amounts of lemon curd and redcurrent jelly are also made. These products find a ready sale overseas as well as at home, particularly in Canada and U.S.A., and some 50% of the production is exported.

Marmalades and jellies are made in boiling pans holding 80 lb. each, the boiling time for each batch being about 4½ minutes. The syrup and fruit juices are metered from 800 gal. stainless steel storage tanks. Syrup is made from granulated sugar which is emptied from sacks through a grill into a steam-heated tank where it is made up into syrup of 66° Brix. It is filtered through a *Meta* filter before being pumped to the storage tanks through stainless steel and *Pyrex* glass pipelines.

Fruit chips are prepared from the fresh fruit by means of a chipping machine, the oil from the peel being recovered. The chips are stored with syrup in casks until required for use. Fruit juice is obtained from the fruit by pressing.

Standard 1 lb. and ½ lb. jars are filled and capped automatically at a rate of 60 to 120 per minute depending on the product and the output required. During capping, the air space in the jar is filled with steam, which condenses when the jar is cooled and forms a partial vacuum. The jars then go through sterilising and cooling units to the labelling machine,

The marmalade packing section (Maryfield).

after which they pass a visual inspection point before being conveyed to the packing point.

The traditional printed white earthenware pots in which a large proportion of Keiller's Dundee Marmalade is packed, need somewhat different treatment, for they have to be washed and capped with hygienic paper caps by hand after filling. Each jar is then individually wrapped by hand in a printed paper wrapper, and the speed with which these hand operations are performed by the practised women workers is astonishing.

Bakery

Alongside the Maryfield marmalade factory there is a large bakery whose products are distributed through a chain of 20 shops and 8 restaurants and tea rooms in cities and towns in Angus and Perthshire. In recording the history of the house of Keiller, emphasis has been laid on marmalade production, but it must not be overlooked, however, that the bakery side of the business has been developing at the same time. The company has received numerous Gold Medals for their Dundee Cake and Dundee Shortbread, the last awards being last year at the "British Baker" exhibition and the International Bakers and Confectioners Exhibition in London. In addition to national distribution, these two products are exported on a very considerable scale, especially to North America.

So as to have a long shelf life, Dundee Cake and Dundee Shortbread are vacuum packed and hermetically sealed in tins.

Quality control

In the Maryfield factory there is a well-equipped laboratory whose function is to test samples of raw materials and materials in process, and to carry out experimental work. Size of sugar particles, sugar and fat contents, and *p*H and refractometer measurement of marmalades and jellies are only some of the many important routine tests. Samples are taken from the production lines every half hour, and their flavour assessed.

Among the various special instruments which the laboratory possesses is one developed by P.A.T.R.A. for measuring the depths of fold creases on cartons. The depth of a crease is ingeniously obtained by measuring the shift of a shadow cast across the fold by an oblique light beam. This instrument has enabled the depth of creases to be precisely controlled, and has eliminated the folding troubles that used to arise when creases were sometimes not of the right depth.

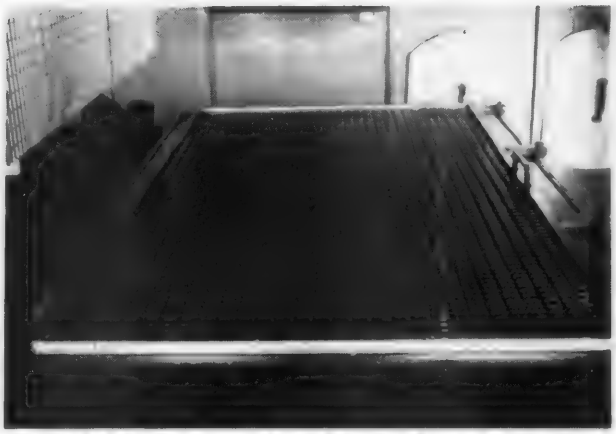
Albert Square factory

In this factory the manufacture of chocolate and sugar confectionery is now concentrated.

Although the exact date when the firm began making confectionery and chocolate is obscure, it is known that the confectionery side of the business was in full swing more than 100 years ago. As far back as 1856, Alexander Keiller was himself taking an active interest in the development of confectionery manufacturing machinery, and in the firm's records at Dundee repose letters of patent granted the firm in 1856, and entitled "Specification of the invention by Alexander Keiller for an improvement in the manufacture of articles of confectionery." The inventor was so advanced with his improvements that some of his plant was still in use up to about 30 years ago.

In the years between the two wars, both the Dundee and London (Silvertown) factories were extended and modernised. The destruction of the Silvertown factory by bombing was therefore a great blow to the firm.

In the Albert Square factory are made boiled sweets, butterscotch and chocolates on a large scale. In contrast to the Maryfield factory, which is on one level, the factory in Albert Square has several manufacturing floors. Full use is made of air-conditioning so that full-scale production can be carried out all the year round.



(*Left*): **A slab of butterscotch which has just been cut with a frame cutter.** (*Right*): **Some of the conches for chocolate manufacture.**

Sugar confectionery

Glucose is delivered in bulk, and granulated sugar in sacks is handled by being emptied through a grill on to an elevator which takes it to steam-heated melters where it is made up into a syrup of 70°Brix. This syrup is continually re-circulated through a ring main, from which it is drawn off as required.

Glucose syrup is stored in a tank of 40 tons capacity in a hot room where the temperature is maintained at 125°F. by gas-heated water pipes. The glucose is pumped to a tank at the top of the building, and from there fed to a ring main in which it is circulated. The feed tank is kept topped up automatically.

Icing sugar is ground in a hammer mill and filled into bags after passing through a cyclone separator, from which the sugar dust is recovered.

Sugar boiling

The basic principles of sugar boiling for sweet manufacture were described in a previous article (October, 1959, p. 375). The boiling pans used by Keillers are totally enclosed, with hinged lids. They are fitted with steam jackets, and are semi-automatic in operation, the syrup quantities being pre-set on the dials of control boxes mounted alongside each pan.

In these pans the water content of the syrup is reduced to 10%. From the boiling pans the boiled syrup passes to a reservoir and thence to the cookers, either vacuum or microfilm, where the water content is further reduced to $2\frac{1}{2}$%.

From each cooker the syrup falls into a collecting pan, from which it is tipped on to a water-cooled metal slab. Essences, colours, etc. measured in small vials, are incorporated, and the boiled sugar mass is worked and folded until the ingredients are well mixed in. When the cooled sugar has set to a ductile plastic mass, it is transferred to a batch roller, where it is formed by rotating tapered rollers into a rope which is extruded through an orifice.

The rope is dimensioned in an equaliser, and after passing a metal detector (which stops the machines if metal is found) travels on to a cutting machine which forms the individual sweets. These pass through an air cooler and then to a battery of wrapping machines.

The wrapping department is air-conditioned and has an air-dryer which keeps the relative humidity below 35%.

Butterscotch

The process for butterscotch differs from that for boiled sugar in that boiling is carried out in gas-fired open pans. After being cooled on metal slabs it is cut with frame cutters, the cut pieces being wrapped by automatic machines.

Chocolate

The chocolate department is completely air-conditioned. Cocoa beans are roasted, winnowed, ground and refined, and the chocolate is finally treated in longitudinal conches.

It is then pumped through a tempering machine to a ring main in which it is recirculated, and from which it is fed continuously to the enrobing machines where the centres are coated. From the enrobers the coated sweets pass to cooling tunnels. Between the enrobers and the cooling tunnels the sweets pass along conveyors where women workers form the decorative twirls on top of the sweets, an operation which can be performed satisfactorily only by hand.

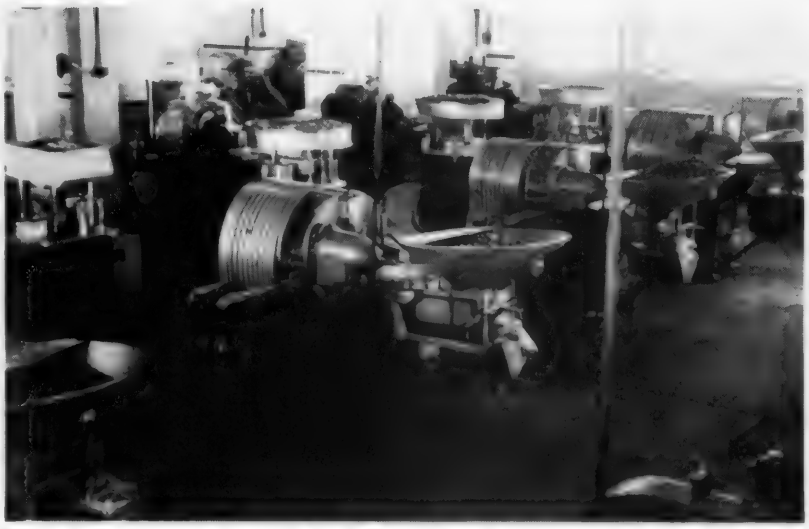
As with boiled sweets, metal detectors at suitable points in the production lines stop the machines should metal contamination be found.

Packing

Packing of the various varieties of chocolate is carried out by hand, at tables where boxes of assortments are made up according to a master pattern. Samples from the packed boxes are taken at random by the quality checker, who examines the contents carefully to see that they conform to packing specifications.

Laboratory

A quality control laboratory examines raw materials and finished confections. This department is also responsible for measuring, by means of graduated syringes, the essences, flavours, colours, etc., into vials for use in production.



Some of the wrapping machines in the boiled sweets wrapping department at Albert Square.

In the experimental laboratory small scale batches of new lines are made and new techniques are tried out. Accelerated shelf life tests on finished packs are carried out at controlled temperature and humidity so that goods can be despatched to various world markets with confidence.

Box-making department

The factory makes its own decorated chocolate boxes, of which about 50 different kinds are used. Sheets of cardboard are cut and scored in a platen press, 4 complete boxes and lids being produced from one sheet. The scored blanks are then folded and glued.

Fancy labels and coloured paper covering for the smaller sizes of box are put on by a semi-automatic machine which glues the paper and affixes it to the box which is positioned in the machine by the girl operator.

Larger boxes and caskets are covered by hand by skilful women workers; each has on hand several boxes at various stages of glueing at the same time.

* * *

Keillers have come a long way since 1797, and it is a tribute to the progressiveness and flexibility of outlook of the management that its methods, developed as a result of the experience of many years, combine what is best of the past with the refinements of modern

Boiled sweets emerging from the cooler on one of the production lines in the Albert Square factory.

technology. The continuing success of its products, particularly in markets where competition is most fierce, is proof that the firm's position in the front rank is secure, and likely to remain so.

Suppliers of Equipment

Baker Perkins, Ltd.: sugar milling and boiling machines, caramel manufacturing and wrapping machines, chocolate manufacturing and foiling machines.
Birlec, Ltd.: dehumidifying plant.
Wm. Brierley, Collier and Hartley, Ltd.: orange chipping machines.
Bramigk and Co., Ltd.: confectionery making and chocolate enrobing machines.
Cinema Television Co., Ltd.: metal detectors.
William Crosland, Ltd.: card box machinery.
Goring Kerr, Ltd.: metal detectors.
Alan Goddard, Ltd.: chocolate refiners.
J. and E. Hall, Ltd.: refrigeration and air conditioning plant.
Robert Kellie and Son, Ltd.: orange processing and jar washing and filling machines, boiling pans.
Metal Box Co., Ltd.: jar closing machines
Morgan Fairest, Ltd.: jar labelling machines.
Rose Bros., Ltd.: sugar boiling, butterscotch and chocolate wrapping machines.
Stephens Smith and Co., Ltd.: chocolate tempering machines.
Stokes and Smith, Ltd.: card box making machines.
Vickers-Armstrongs, Ltd.: card box making machines.

How to cook Rice

THIS recent addition* to the imposing list of Andre Deutsch cookery books will have no appeal to that half of the population of the world who are habitual rice-eaters, for they are familiar with methods of cooking rice to suit their particular region. It will, however, be welcomed by the considerable number of people who eat rice only occasionally and would eat it more often if it were properly cooked.

There are thousands of varieties of rice and many ways of boiling it, for it is a fact that the correct method of cooking depends largely on the variety. The main object of boiling rice is to produce a fluffy mass in which each grain is separate and there is no tendency for grains to adhere to one another or of the whole turning into a "gooey mush."

While the main part of this book is devoted to recipes for soups, fish and chicken dishes, pilaus, risottos, casserole dishes, stuffings, salads and sweet dishes, based on rice, one may regard the first thirty pages as the most important and alone worth the price of the book, although they are only concerned with what many, in their innocence, may regard as the simple process of cooking rice.

The young and inexperienced cook will find this book useful; those who have lived in the East or in other parts of the world where rice is appreciated and curry is an experience not to be forgotten, will find a nostalgic delight in its pages.—D. H. G.

* *Rice Cooking*. Robin Howe. Andre Deutsch, London, 1959. Pp. 276. 12s. 6d. net.

The Baking Industry

By Edmund B. Bennion,* M.Sc.Tech., F.R.I.C.

Bulk flour handling ★ flour quality ★ continuous mixers ★ mechanised roll production ★ bread cooling ★ research ★ trade organisation ★ education and apprenticeship

NINETEEN fifty-nine will go on record in the Baking Industry as the year of the third post-war Bakery Exhibition at Olympia when standards were reached which had not been seen since pre-war days.

The show itself assumed Olympian proportions and grandeur, particularly as far as the layout of the exhibition itself, the splendour of the stands and the displays by the Allied Traders and manufacturers of machinery. It is realised that today truly fabulous prices have to be paid for floor space at such exhibitions, but this must have been a small item in relation to the cost of the stands themselves. It was obvious that designers and display artists must have done pretty well out of the show, but they did succeed in making it worth while and most memorable.

During the year more amalgamations of bakeries have taken place and many small bakeries have been closed down, but alongside this the number of shops selling bakery products has increased due to the keen competition between the major bakery groups.

In London, particularly, oven fresh crusty bread has been very much in evidence and some of the plant bakeries have entered this field and a wide variety of attractive crusty loaves have been on sale. This has undoubtedly tended to stem the decline in bread consumption.

There is, however, a tragic change taking place in many towns where re-development schemes are being carried out. Sites in main shopping centres are being cleared and expensive concrete faced buildings erected which have to be let at such rents that the family baker and grocer can no longer afford to rent such positions and so they are being forced into side streets or driven out of business. It is only the supermarket or stores selling electrical goods and television or other goods on hire purchase which seem able to meet these new high rents.

The answer to this problem seems to be in the individuality of the baker and confectioner who, by making appetising attractive lines which come into the shop fresh and even hot from the oven, with all the accompanying pleasing fresh odours, will draw the customers from the high street in search of the cakes or bread which smell so good. Shops which roast their own coffee never lack for custom since the smell pervades the district around; why not the same for the family baker and the goods he makes!

* Head of Department of Food Technology, Southampton Technical College.

Bulk flour handling

For some years now the bulk handling of flour has been increasing and with the rationalisation of bread production by the absorption of so much of the bread producing potential by the milling combines, the introduction of bulk handling plant is proceeding. Any development of this method of flour delivery involves the installation of suitable plants in the bakeries which must be geared to the provision of facilities in the mills for the despatch of flour in bulk containers. Henry Simon, Ltd., have made great progress with the design of such plant and Baker Perkins, Ltd., have also joined in this development by linking up the bulk deliveries with distribution of the flour in the bakeries themselves.

This system of flour handling not only introduces great economies in packing and distribution but makes for improved hygiene in the bakeries themselves, as well as the elimination of waste.

In the smaller units, flour deliveries in jute bags is likely to continue no doubt for many years, so long as the present stocks of sacks remain serviceable, but in the long run it should lead to the introduction of paper or cotton non-returnable sacks for all flour. A further development which can be anticipated is the introduction of smaller packs for the establishment mainly concerned in confectionery production where a wider range of speciality flours is most desirable which are only used in relatively small quantities each week. Such packs are done for the shipping companies; why not similiar ones for the baking industry, their biggest customers?

The Strahmann mixer. (*Left*): **A typical trial installation under normal production conditions in a bread bakery.** (*Right*): **A close-up showing the delivery of dough from the nozzle. The dough in the left-hand area of the picture has rapidly recovered from the "shortness" apparent on discharge.**

Flour quality

During the first half of the year, flour quality was maintained at a high level by the use of a high proportion of imported wheats, so that when the English harvest was due it was expected there might be some change in the flour strength. Owing to the extraordinary fine summer and harvest, this was not realised, for the quality of English wheats has been better than for very many years. All English flours have possessed excellent baking qualities and have for the most part carried a record water absorption, so that since September the water absorption of all home milled flours has been higher than for many years. This has been a very pleasant change since it has resulted in higher yields of bread of good quality.

Most flours have been improved by the judicious use of malt products, and fungal enzymes have come to the fore as a means of adjusting the maltose figures of flour. Malt products, however, still hold their popularity with many of the small bakers, and this season's flours have been capable of carrying an addition of such products without any risk of troubles arising even if used indiscriminately.

During the year, interest has, however, been aroused by the research into impact milling, and the work of D. G. Elias of Henry Simon, Ltd., and C. R. Jones, P. Halton and D. J. Stevens of the Flour Millers Research Association, on the separation of flour into fractions of different protein strengths by means of air classification has shown the possibilities of this system.

This system seems likely to prove of tremendous value particularly in the utilisation of English wheats, since such wheats seem to break down more easily in an impact mill than hard wheat such as Canadian wheats. The value of the process lies in the fact that the pieces of the broken grain consisting solely of protein are even smaller than the starch grain. It is possible to split the parent flour into a large number of fractions and to vary at will the limits of particle size which define each fraction. Usually, however, three fractions only are obtained. The finest fraction (*e.g.* less than 15 microns) is the highest in protein and also in the enzymes and coloured matter associated with proteins. The middle fraction, *e.g.* (15-40 microns) is lowest in protein and consists mainly of starch grain. The next in size (*e.g.* over 40 microns) is intermediate in protein comparable with the parent flour except that it has a more even particle size.

It thus seems likely that this process may usefully extend the range of flours available to the baker. Thus the high protein fraction separated from an English flour, when suitably treated with an oxidising improver, may be used as a supplement to increase the strength of a flour for breadmaking purposes, whilst the low protein fraction when suitably treated, *i.e.* chlorinated, may prove suitable for high ratio cake work, whilst untreated it may prove most useful flour for all types of cake work. As yet this is mainly in its experimental stage but during the next twelve months great developments are anticipated.

Continuous bread and cake mixers

In a review of development in dough mixing last year details of the Domaker process were given and since then manufacture of these plants has been going ahead in this country. As yet only one of these plants is in commercial production. During the year under review, Henry Simon, Ltd., have developed the Strahmann mixer and at the Olympia Bakery Exhibition they had, on show on their stand, a commercial machine. This mixer marks a considerable advance in conventional methods of dough mixing. Essentially it is a machine for the fully automatic

(*Left*): **Production of hamburger rolls.** (*Right*): **Production of "Wimpeys" as used by J. Lyons and Co.**

and continuous production of homogeneous doughs for all types of bread, biscuits and other baked goods.

Doughs produced by this mixer may be subjected to a normal bulk fermentation or may be operated on a no dough time system. Thus no preliminary system for producing brews is necessary unless desired for no time doughs. The mixer is accurately fed with flour and prepared liquids of up to four kinds at any one time, thus allowing for the separate addition of yeast, salt, fats or brews in such proportion or combination as may be desired.

The dough is forced along a tunnel by a series of sixteen impellors fitted to a centre shaft, containing apertures of diminishing size. The impellors moving at 115 r.p.m. both shear the dough against the disc and force it through an aperture so that it is continuously being cut and re-united. Dough is in the mixer for about thirty seconds before being forced out of the nozzle in a continuous length of uniform diameter. The rate of output may be varied up to a maximum of 1½ tons per hour, that is to say a Strahmann mixer can keep a nine sack an hour plant continuously supplied with dough. Compared with high speed mixers it is a small compact unit easily cleaned, since all working parts are readily accessible.

Continuous cake mixing continues to find favour in certain types of confectionery establishments where it can be adjusted to the type of confectionery normally being made. It has been found flexible, and those firms who have adopted the use of mixers of this kind to their particular business have nothing but the highest praise for them. The usefulness of these machines, like many others, depends on the technical ability of those using and operating them.

Mechanised roll production

The main development in conventional cake mixers has been the streamlining of some models and a "new look" for others, whilst automatic devices for tipping mechanisms have been introduced to some of the older types of horizontal mixers.

Much progress has been made in the design of all purpose enrobers for the smaller units and cake cutting and slicing machines for preparing the cake pieces to be used in such machines. For the most part the development has been in the direction of producing smaller counterparts of the larger machines which have been operating in the factory bakeries.

Improvements in pastry rolling machines have taken into account the importance of allowing for the extensibility of pastes and recognition of the damage done in the past by lack of attention to this factor. Not only do these improved machines give a more regular paste but yields can be more effectively controlled with considerable financial advantage.

It has never been considered necessary to have a guard on a vertical cake mixer and obviously the factory inspectors have been satisfied about this. It was, therefore, with particular interest that the display of a guard on one of the larger types of mixers was noticed at the Bakers Exhibition on the stand of the Morton Machine Co., Ltd.

Probably one of the most outstanding developments of recent years as shown at the Olympia Exhibition is the mechanisation of roll production of all types. With the increasing demand for rolls, hamburgers and beefburgers, it is not surprising that attention has had to be paid to streamlining production of these and other types of soft rolls as well as crusty rolls, tea cakes and all types of buns. The Winkler units with all the various machines which can be incorporated are now extensively used including special automatic slicing machines for beefburgers and hamburgers and electronic roll batch counters.

Automatic tart and pie making machines also have increased in their usefulness and scope and in conjunction with these pastry stamping and cutting machines for special types of work. Danish pastries are now proving exceedingly popular so that special attention has been paid to the provision of special plant for manipulating this type of paste.

Doughnuts have always been popular but there seems to be an ever increasing demand for them in snack bars and canteens, and the fermented doughnut is finding more favour than the powder aerated variety, so that means of ensuing continuous production have become necessary at the frying end, and numerous continuous frying pans have been devised with outputs of thousands of doughnuts per hour. These pans not only ensure continuity of production, but an evenness of cooking not hitherto possible over a large production and with economy in the use of frying oils.

Bread cooling

The control of bread cooking has always been a major problem, and much thought has been given to it and experimental work done on a limited scale both in this country and in America. In view of the importance of this phase of bread production and the increase in the use of automatic slicing and wrapping procedures, it is surprising that more research has not been put into this problem by the baking industry itself. It would have seemed an eminently suitable and objective matter for the Research Association to tackle, let alone individual concerns and groups.

It looks as though the policy has been to let some one else spend the money on research, make the mistakes and have all the headaches and then when something workable has been produced cash in on it. Fortunately natural conditions have favoured the baker in his cooling problems, as in so many others, so that he has not been compelled to expend sums of money on research in the past. With the changing nature of the trade and the changing habits of people the need for research becomes more apparent, and more money will have to be spent in the future if both the larger and smaller units are to maintain their production at the level which will be expected of them, with fewer mistakes and faults occurring.

Fortunately for the industry, engineers are interested in their problems, and the Spooner machinery company have tackled the problem of bread cooling with the same vigour they put into baking ovens when in less than a quarter of a century they have gone so far ahead in oven design on an entirely different basis from those hitherto employed. It looks as though their bread cooler will prove the answer to the problem of having bread ready for slicing within a reasonable length of time of leaving the oven instead of either having to wait six hours at least or sell sliced bread at least thirty-six hours old at the beginning of the week.

The unit designed is synchronised to fit in with the continuous bread production line. It is a housing enclosing a conveyor system based upon the use of multi-shelf swing trays which are driven around a closed rectilineal path, with a controlled flow of washed and conditioned air. The loading and unloading of the tiered trays is carried out automatically. It embodies the use of washed and conditioned air circulated at a high volume rate of flour. By this means the load centre temperature of standard 1¾ lb. loaves can be reduced from 210°F. to 77/78°F. in 2½ hours. The cooler is available in capacities from six to nine sacks per hour.

Other means of bread cooling which have appeared again after a lapse of many years is the large travelling cooler with capacities ranging with the size of the oven to which it is geared and the length of time required for cooling.

Research

During the year under review the new Director of Research for the British Baking Industries Research Association has got into his stride. Certain aspects of the work at Chorleywood have been reorganised and the publications have been issued in a new and more attractive form and in a size more easily handled. In these days of rushing about and congestion in public transport a small journal or booklet which fits into the pocket and can be held in one hand for reading is more convenient than a larger journal which demands more elbow space. The "new look" is very welcome!

A most useful survey of bakery machinery is being carried out wherein all types of machines such as dough making plant, dough dividers, pie machines, etc. are all listed and the manufacturers' names and addresses and the size and capacities of the machines, modes of operation and approximate prices are given. This is particularly valuable because when the time comes to consider replacement of machines or the purchase of additional plant, one sometimes makes the mistake of reordering one of the type previously used and missing a greatly improved piece of machinery made by another firm. Sometimes people are more particular in selecting their motor car than their bakery plant!

An interesting piece of research has now been completed on the relative value of eggs from hens reared in a battery and by free range methods. Apart from the difference in colour of the yolks from the free range eggs, no commercially significant difference was revealed either in laboratory quality tests or in practical cake baking tests.

Long term investigations now in hand deal with the staling process in bread. This is being tackled along several lines, the physical chemistry of starch gelation and the compressibility of bread crumb. Gels of wheat starch prepared in various ways are being examined, but particular attention is being paid to those prepared below the temperature of 100°C. under such conditions that the majority of the granules although swollen have not burst. The elasticity and viscosity of such gels stored at 65°F. and 75% relative humidity have been studied, and it has been found that there is a rapid initial increase in elasticity followed by a slow decrease over a period of several weeks.

There is evidence that the initial increase of elasticity and the occurrence of syneresis result from loss of water from individual starch granules resulting in a decrease of inter-granular adhesion, an effect

The Spooner bread cooler. (*Left*): Entrance to the cooler. (*Right*): General view of the installation.

which will tend to reduce the rigidity and increase the elasticity of the gels. The subsequent slow fall in elasticity is probably due to crystallisation of starch within individual granules, a process which results in a change of X-ray diffraction pattern.

Influence of staling inhibitors on starch gelation has been studied. Results suggest that as these substances tend to be absorbed on the surface of the starch granules, the retardation of staling is brought about by the prevention of loss of water from the starch granules by diffusion from the starch granule.

Accurate methods for determining crumb softness are being investigated, since bread is by no means an easy material to be subjected to physical tests and small differences in additives can have remarkable effects.

With the increasing interest and development in continuous mixing of doughs, much work has been done on brews, but in addition attention has been paid to flour characteristics since these will be very closely tied up with any development of the process in this country. Work to date suggests that it is possible to use almost any kind of flour, provided proper chemical treatment procedures are followed, with a brew or a chemical development process of this kind.

Other work of considerable significance which is being pursued is the relationship of power requirements to continuous mixing and dough development processes; this may well lead to important developments in the mechanical aspects of baking processes.

In view of the importance of fungal enzymes in commercial products, attention has been paid to them and a procedure for the detection and semi-quantitative determination of fungal amylase in flour has been worked out.

Work on the foaming capacities of chlorinated cake flours are being investigated in conjunction with work on air classified flours.

Short term investigations have dealt with day to day problems on confectionery and bread, microbiological problems concerned with mould spoilage of goods, the weight of bread with a view to changes in legislation affecting short weight and work study on the organisation and layout of bakeries.

Trade organisation

With the changes which are taking place in the structure of the trade, trade organisation has come under review. Since the war the National Association of Master Bakers have been developing a system of regionalisation which was propounded a quarter of a century ago but which was not acceptable to the individualistically minded baker of the day. Since then, however, changes have taken place in the people who are responsible for the associations, and younger men are at the helm who are prepared to move with the times, so that by degrees regions are being created directly responsible to the national parent body, whereas in the past federations existed but these were only very loosely federated. This should lead to a considerable strengthening of organisation so that the national body should soon be in the position of speaking for a unified trade of family bakers.

It looks also as though trade charities may come under some consolidation so that effort may be directed towards one objective instead of being dissipated in several directions as at the present time. Progress has also been made with the Night Baking provisions whereby agreements are being reached in many areas between the Master Bakers Association and the Amalgamated Union of Operative Bakers.

The work of the Food Standards Committee on milk bread has caused much discussion and it is hoped that a satisfactory conclusion will eventually be reached.

Education and apprenticeship

Education and apprenticeship are grouped together since not only are they so closely linked together but are actually complementary to each other.

During the past year the number of students attending bakery schools has shown a decline, due no doubt to the smaller number of production units. Apprenticeship, however, is making some progress which, however, is rather slow in some parts of the country. This past year has seen a great many youths completing their full four year apprenticeship, for these were those who joined the industry after the apprenticeship scheme had got well under way. During the year scholarships have been awarded, many of them having been subscribed by the Allied Traders, and competition for them is keener than ever and the standard of entrants in 1959 were pronounced as above average.

The National Bakery Diploma Course of training continues to attract new entrants into the industry as well as provide a sound scientific and practical training for the sons of master bakers and executives in the industry, whilst the Higher National Diploma Course attracts a very limited number of young men and women who have completed the ordinary Diploma and wish to work for a more scientific technological qualification to take them into the fields of research or into the experimental laboratories of the Allied Traders. Some hope for advancement in the industry itself, but as yet the industry has not devised any scheme of recruitment whereby those who obtain such a qualification can see an assured future.

FOOD MANUFACTURE
ANNUAL REVIEW

The Ice Cream Industry

By Eric L. E. Humphriss, A.R.I.C., M.I.Biol.

Consumption ★ new stabilisers and emulsifiers ★ overseas trends

THE past year, 1959, proved to be an interesting, instructive, and profitable one for the ice cream industry. Possibly the two outstanding happenings were the phenomenal summer and the introduction of the revised compositional standards.

In this Statutory Instrument[1] both dairy ice cream and milk ice were defined and chemical standards for both grades established.

The amended regulations dealing with the labelling of food[2] specified pretty stringent requirements in relation to the labelling and advertising of the various types of ice cream. These two S.I.'s are really complementary to one another; both came into operation on April 27, so that last year was the first year wherein dairy ice cream enjoyed statutory recognition.

Consumption

In view of this, and the weather, it is interesting to examine the figures available bearing on ice cream consumption.

It has been stated that, on the average, the British eat about 2 gallons of ice cream per head in a year, whereas in America, the mean annual *per capita* consumption approximates to 6½ gallons.[3] Even if this latter figure is in U.S. gallons, it still means that, theoretically at any rate, we can double our own present-day production. According to a recent note in the daily press we ate more ice cream in 1959 than ever before, but estimates of this increased consumption, compared to 1958, vary from 10%[5] to 17%.[6]

The B.D.F.A.[4] estimated that whereas in 1958 some 3% of the ice cream sold in Great Britain was dairy ice cream, in 1959 this figure had risen to 17-18%. It is probable that the 5-fold increase in sales of this grade were helped by the legal recognition of this grade of ice cream, plus the press publicity campaign sponsored jointly by the Wholesale Ice Cream Federation, the Milk Marketing Board, and the Butter Information Council, and the fact that following the Report of the Food Standards Advisory Committee,[8] twelve months earlier, the trade had tacitly accepted the fact that legal recognition of dairy ice cream was "on the way."

Two inferences follow from the above brief review. In the first place, and admitting that there is still room for expansion, the year 1959 was the best ever for the trade, and secondly a further increase in consumption of dairy ice cream can be anticipated in 1960.

A consideration, not perhaps always given the prominence it merits, is that the retail price of ice cream has only risen by 50% since before the war and has not increased at all over the last nineteen years.[7]

Perhaps the ultimate in academic achievement during 1959 was the selection of "ice cream" as the subject of the chairman's address to the Sheffield University Chemical Society. From the necessarily condensed accounts of Dr. Boffey's dissertation we have read, we seriously suggest that it deserves much wider publicity, especially within the trade; indeed it merits publication, in full, in one of our trade

journals, if this can be arranged. Incidentally, we note that Dr. Boffey expressed disappointment at the quality of ice cream obtainable in Italy, to which we would add from our own observations in 1959, that Dr. Boffey would have been equally dissatisfied in Belgium, France and Holland!

Of technical and/or scientific developments during 1959 there is little or nothing to record.

We were rather surprised to observe how very readily the re-melted mix of one of our leading distributors "buttered" when shaken. There may be some hidden virtue in this which escapes us; however, we did notice an abstract of a paper by D. R. Frazeur[9] bearing on this topic in relation to soft-frozen ice cream.

New stabilisers and emulsifiers

The use of cellulose ethers and their derivatives as mix stabilising agents appears to be attracting increasing attention both here and in the United States; indeed, we heard quite recently that one sizeable production unit had abandoned traditional stabilising agents in favour of an ethyl methyl cellulose carboxy methyl cellulose mixture, with satisfactory results. In the light of some experimental work we ourselves did some few months ago, this did not altogether surprise us. Likewise, there is evidence that the numerous emulsifying agents on the market are being studied, doubtless with a view to finding one or more thereof, which might be more efficient in ice cream mix than the now traditional glyceryl monostearate. This latter compound, of course, enjoys a distinct advantage in that its complete innocuousness, as a food additive, is now universally recognised.

Overseas trends

It is interesting to note in passing, that our Russian colleagues appear to be covering what one would have thought to be well trodden ground in their investigational work on ice cream technology. Is this, one wonders, because they are unaware of much of the literature that has accumulated over the past twenty-five or thirty years and is to be found mainly in American trade journals? It would appear that ice cream is "immensely popular" in Russia[10] and available in a wide range of flavours and packs. Benson, in the above quoted article, indicates that the hygienic precautions taken over ice cream manufacture in Russia are no less stringent than they are here; and describes the all the year round demand for ice cream there as a "never-ending-wonder" to the visitor. This observation surely points the way to future expansion here, a prospect already being exploited by at least one large British company, this winter.

Perusal of the annual reports of medical officers of health and of chief public health inspectors is always a worth while activity for anyone engaged in the food industry. Whilst obviously the 1959 editions will not be available for some months yet, those we have seen covering 1958 in general expressed satisfaction with the bacteriological quality of the ice cream sampled within the areas concerned; approval based in most cases on the modified methylene blue test.

The "Super Creematic" freezer made by T. Giusti and Son, Ltd., which is designed to operate with all types of dairy mixes from low fat custards to high fat recipes. A refrigerated mix tank of 3 gals. capacity feeds into freezer as ice cream is served by means of an electrically controlled metering valve.

It is a matter of common observation that increasing attention is being devoted to packaging and presentation of ice cream, so much so, that one trade journal[11] devoted its commencement of the 1959 season issue exclusively to this subject. There is obviously a wide field for investigation and progress here.

From private sources of information one can record the fact that ice cream, as we know it, is gaining popularity in the Orient. It seems that, during the past year, a considerable volume of enquiries concerning the technology of ice cream manufacture according to British practice was dealt with; presumably a certain amount of business resulted for makers of plant, machinery, and equipment. In any event, there would appear to be considerable scope for business of this nature in the Far East.

In conclusion then, the British ice cream industry enjoyed an unprecedented boom in 1959 thanks in part to the wonderful summer, and in part to the trade's own efforts and perspicacity.

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WORLD FOOD SUPPLIES—I

Sources of Food–1

By Francis Aylward,* Ph.D., D.Sc., F.R.I.C.

Rising world population makes imperative a large increase in food production. This increase can be achieved provided that the resources of human knowledge and ingenuity are applied systematically and quickly. The layman is frequently bemused by the current spate of opinions, arguments and advice, much of it conflicting, tendered by various experts. What are the facts? We publish this month the first of a series of articles from the pen of Dr. Aylward, a noted authority on nutrition whose previous articles will be familiar to regular readers. This series will be divided into three parts—Sources of Food, Choice of Foods, and Standards of Nutrition—and will survey, in the author's highly readable and vigorous style, the basic facts about world food supplies and their nutritional aspects.

THE foods of mankind, whether they be animal or vegetable products, are derived ultimately from plants or micro-organisms which convert simple inorganic substances into the more complex food components. Life thus depends ultimately on a series of biochemical reactions including photosynthesis (the production of sugars and starches from carbon dioxide and water through the agency of the chlorophyll complex and in the presence of light) and the micro-biological production of protein.

The "carbon cycle" and its associated "nitrogen cycle" are therefore of fundamental importance in connection with food supplies, but there are other "cycles" also, involving elements such as phosphorus and sulphur. Of special significance is the water cycle; water supplies have always in the past played a major, if not the controlling, rôle in determining what areas of the world could be inhabited by man.[15, 23]

Any discussion regarding national or world food supplies must therefore take into account the relations between man and his environment—the air, soil and sea, land and marine plants and animals and micro-organisms of many types. This study—of *human ecology*—brings in many different scientific disciplines and like many such "hybrid" areas of knowledge is frequently neglected.

Nicol in various stimulating papers[36] has given examples of errors which have been made (and promulgated) by experts in different branches of science who have concentrated their attention on one aspect of the food problem without regard for the many interrelating factors.

Many who have written on world supplies have presented a gloomy picture of the world as it is, and an even bleaker forecast of the shape of things to come. Attention has often been focussed (especially by American authors) on the loss of fertile land by soil erosion and other causes—for example,

There is scope for improvement here! This traditional local harness used for Ill-matched plough beasts in Morocco hurts the animals and does not make the best use of draught power. The Moroccan Government has asked for, and received, advice from F.A.O. on how to improve indigenous farm tools and equipment.

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Table I. Land and Soil

Aims	Some methods
1. Improvement of existing cultivated land by: (*a*) reclamation of poor soil; (*b*) reclamation of deserts.	1. Sound agricultural practices leading to improved fertility, including: (*a*) avoidance of excessive monoculture; (*b*) mixed farming—balance of plants and animals; (*c*) balance between organic and synthetic fertilisers; (*d*) balance between forests and cultivated lands; (*e*) physical methods of soil treatment (e.g. krilium).
2. Extension of agriculture in difficult regions, i.e. polar and tropical regions, mountains, flood areas and swamps, and jungle area.	
3. Reclamation of land from sea, deltas and lakes.	
4. Avoidance of loss of land from: (*a*) soil and coast erosion; (*b*) use of fertile land by non-agricultural building.	2. Engineering techniques: (*a*) terraces, drainage; (*b*) irrigation, reservoirs; (*c*) dams, dykes, canals.

the loss of 50 million acres of productive land in the U.S. alone.[11, 17] Problems of this magnitude clearly cannot be ignored and it is right that they should be emphasised, so that remedies can be found—and applied—and so that men may learn from the errors of the past.

An authoritative survey

Fortunately we now have available in Sir John Russell's *World Population and Food Supplies*[15] an authoritative survey which is indispensable to anyone who wishes to obtain a sense of perspective. It has been rightly claimed that this book by the former director of Rothamsted "will remain unique in its generation." Successive chapters deal in turn with different countries or areas of the world and present an account of the development of agriculture and successes achieved by man in coming to terms with his environment.

The picture that emerges is one of wide contrasts (based partly on the accidents of history and geography) in conditions from one country to another, so that no uniform formula for betterment can be proposed; nevertheless, the basic principle of agricultural science and agricultural engineering can be made better known, and the experiences gained in one country (or in one area in a country) can be examined to see how far they can be applied elsewhere.

This diffusion of information is, of course, a primary objective of the Food and Agricultural Organisation of the United Nations, and the F.A.O. reports[25] contain much information of value and illustrate how steady, and sometimes spectacular, progress has been made.[3, 4]

The literature on food supplies is large and dispersed and an attempt has, therefore, been made in tables 1 to 5 to present in concise form some of the many suggestions that have been made. Each of these tables will now be briefly considered.

LAND AND SOIL

Many writers have drawn attention to the relatively small area of the world's surface that is under cultivation, probably less than 10% of the total land area. Although some mountainous and other regions must be excluded from consideration, there is agreement that much could be done to extend the area of agriculture. The P.E.P. report[13] suggests that an increase of only 25% is possible, but various authorities give much higher estimates.

Thus Clark has stated: "The world's total land area (excluding ice and tundra) is 123 million sq. km., from which we exclude most of the 42½ million sq. km. of steppe or arid lands, discount anything up to half the area of certain cold or subhumid lands, but could double 10 million sq. km. of tropical land capable of bearing two crops per year. We conclude that the world possesses the equivalent of 77 million sq. km. of good temperate agricultural land."[31]

The key to improvements of existing cultivated land is essentially *good husbandry*, sound agricultural practice based on experience and scientific knowledge. Physical as well as chemical and biological methods of soil treatment may play an important part; thus it is reported that krilium, a synthetic polymer, is from 200 to 1,000 times more effective than peat moss in promoting the stabilisation of the soil allowing aeration, water retention and plant growth.[10]

The "sound agricultural practices" outlined in table 1 are merely examples among many that have stood the test of experience.[15]

Engineering achievements

Engineering techniques may be all important both for the improvement of land (*e.g.* by adequate drainage or irrigation) or for reclamation. Familiar examples in Europe are in the Netherlands (the Zuyder Zee and more recent projects) and in Italy (the drainage of the Pontine Marshes in the vicinity of Rome).

Anyone visiting the Southern Provinces of Italy and Sicily cannot fail to be impressed by the extensive and (long overdue) irrigation schemes which are having a profound effect in one of the poorest regions of Europe. In Sardinia too there is visible evidence of the great changes brought about in the past two decades. Irrigation was important, but had to follow a public health scheme for the elimination of malaria. (The story of Sardinia is one of great interest in revealing the impact of science and technology on man; for 2,000 years or more malaria was endemic and its effects were obvious on both land and people; the Anglo-American forces armed with D.D.T. began in the war years as a military enterprise a campaign which led to the virtual elimination of malaria and the transformation of the island into one fit not only for agriculture but also for tourism!)

In the United States, irrigation projects have been carried out for the past half century on an increasing scale, and arid lands in Nevada and Southern California and else-

where have become flourishing centres of agriculture. Visitors to El Paso in Texas on the Mexican border have for many years contrasted the irrigated American countryside with the semi-desert land on the other side of the international bridge over the Rio Grande river.

On a different scale is the vast multi-purpose programme sponsored by the Tennessee Valley Authority (T.V.A.) which through a network of dams and hydro-electric schemes has provided not only for the regeneration of land through irrigation, but also a source of power to form the basis of industrial developments which have had a profound effect on a region two-thirds the size of England.[6]

The Volta River Plan now going forward in Ghana has similar objectives and various other large scale programmes are possible in other parts of the world, providing methods can be found to finance them.

The spectacular success of the T.V.A. plan should not be allowed to obscure the achievements of a host of smaller projects in Europe and overseas which have contributed so much to agricultural production; but it must not be forgotten that such schemes presuppose that water supplies are available. A major research problem is to find an effective and economical method for the utilisation of sea water for agriculture.

Loss of land

Reference has already been made to the loss of agricultural land from soil erosion; there is now a body of scientific and technical information on this subject and there seems no reason why in all countries excessive losses should not be reduced by sound practices. Authors in the U.K. and elsewhere have rightly urged that any plan for increasing the area of cultivated land should take into account the heavy losses that can occur by the diversion of fertile land to non-agricultural purposes; this is a problem of special importance in island communities such as Great Britain.[8]

An example of controlled irrigation near Quetta, Baluchistan, where F.A.O. experts co-operated with local government officials in carrying out the project.

If one considers the many reports which have been published on land and soil there would appear to be reasons for optimism that a considerable expansion of use can take place providing there is the vision, skill and capital. These three do not always come together, but it is possible to point to the State of Israel which can be regarded "as a pilot scheme for the settlement and development of marginal dry lands,"[13] and to suggest that similar programmes are technically possible in many countries in Asia, Africa and South America.[2, 17]

INCREASES IN CROP PRODUCTION

Various reviews and reports outline methods which have been used with success in the U.K., U.S.A. and other countries for the increase in agricultural production and reference may be made especially to Chapters 3 and 10 in Oser's book,[10] to the recently published international symposium *Science and Mankind*,[18] to the co-operative survey of various British authors,[19] as well as to various monographs.[15, 16]

It is well known that even in one area there may be wide differences between different farms; the efficiency of farming (as shown by an index of crop yields) varies greatly from one country to another. Because of the differences (not all of which are due to soil and climatic conditions), many observers believe that there is considerable scope for increased production,[31] providing there can be a wider diffusion of good practices with an increased use and balance of fertilisers and the right choice of seeds.

Thus Russell has stated:[15] "In all the countries examined there is a considerable gap between the best and the average food producer which can certainly be narrowed, thereby increasing the output of food. And in all countries even in the most advanced, there is an equally great or even larger gap between the present achievements of the best farmers and the high yields occasionally found as a result of combinations of factors which in Nature occur only rarely, but which if we could discover and reproduce them would make these rare records a more usual, perhaps everyday occurrence."

Many reports from different countries illustrate what can be achieved, if only on a local basis, by some of the methods outlined in table 2. Thus, the introduction of hybrid corn in the U.S.A.

led to an increase in yield of 20%; wheat experiments in the United Province of India showed that an 80% increase in yields could be obtained with a combination of compost and synthetic fertiliser;[20] a recent report[18] from China claims an increased output of grain of 68% over the period 1949 to 1956. No one would suggest that increases of the magnitude quoted could be maintained on a continuing annual basis, but it is clear from the F.A.O. reports that progress is being made and that long term plans are beginning to show some results.[3, 4]

Table 2. Land Crops and Domesticated Animals

Aims	Some methods
A. CROPS	
1. Improvement of yields and nutritive value of existing crops.	1. By improvement of existing land and extension of area of cultivated land, as in table 1.
2. Introduction of new varieties or species: (*a*) with higher yields; or (*b*) higher nutritive values; or (*c*) higher yield of some one constituent (e.g. fats, sugars); or (*d*) more adaptable to climate or soil conditions; or (*e*) more resistant to pests or disease.	2. Correct use and balance of fertilisers: (*a*) greater use of natural fertilisers through compost and similar systems; (*b*) increased production and use of synthetic fertilisers.
3. Extension of horticulture, especially (*a*) in regions around towns; (*b*) as allotments in towns; (*c*) extension of cultivation under glass.	3. Application of sciences of plant genetics and of plant pathology to give crops with improved characteristics, and to give disease-resisting strains.
4. Reduction of loss of growing crops through (*a*) **animal pests** such as rabbits, rats, insects; (*b*) **other pests and disease producing organisms** such as fungi; viruses; (*c*) **other plants**—weeds.	4. Newer methods of pest control and of selective toxicity. 5. More intensive study of plant physiology—including the role of trace elements.
B. DOMESTICATED ANIMALS	
1. Improved methods of feeding to obtain better conversion of plant feeding stuffs to animal products.	1. Application of newer knowledge of nutrition.
2. Maintenance of balance of types of domesticated animals (e.g. dairy cattle and pigs) to enable best use to be made of land available and feeding stuffs.	2. Application of knowledge of animal genetics.
3. Improvement of existing domesticated animals for higher milk yields or other desirable characteristics.	3. Artificial insemination of cattle and other animals.
4. Introduction of new breeds and crosses to give improved characteristics, including resistance to disease.	4. Application of veterinary medicine with modern knowledge of chemotherapeutic and other control agents.
5. Reduction of losses through diseases of livestock.	

Fertilisers need power

Nicol[36] has noted that even a proposal for increased use of fertilisers, while superficially simple, raises fundamental issues. He has pointed out that the revolution in agriculture, which took place about 50 years ago with the introduction of synthetic materials from atmospheric nitrogen, was achieved at the expense of power in that the equivalent of 5 tons of coal is required to produce 1 ton of fertiliser.

In the U.K. and elsewhere the source of power has been coal itself, a fossil fuel of which supplies are certainly not unlimited. Thus short of new sources of power (and here atomic energy may be the answer) there is a limit set (in time) to the production of nitrogenous fertiliser. He has also stressed the requirements for phosphorus, potassium and sulphur (including sulphuric acid used in manufacture) but the reserves of the first two of these would appear to be very considerable.[10]

For the above as well as other reasons it is unwise in any world survey to neglect the use of natural fertilisers, especially compost and allied systems. Often in the U.K. there is a tendency to dismiss these systems, but there is abundant experience in Asia and elsewhere to show their value.

The U.S. Department of Agriculture estimated that in the U.S.A. alone there was produced annually sewage equivalent to over 500,000 tons of nitrogen, 180,000 tons of phosphoric acid and 160,000 tons of potash. Various American cities have built disposal plants "to produce sludge that is odourless, sterile and harmless" but excellent as a fertiliser (and containing various trace elements, as well as organic matter, nitrogen, phosphates and potassium).[10]

Trace elements

It has become evident over the past few decades that progress in agriculture depends on research in the plant sciences and in particular plant physiology, genetics and pathology. Few advances have been of greater significance than the realisation of the importance of trace elements such as molybdenum, cobalt, zinc, copper and manganese. Although the part played by these elements is far from clear, it has been possible to apply the new knowledge on a large scale. Thus it is claimed that the addition of trace elements will open up 4 million acres of new land in Australia and will revitalise old pastures for the grazing of "2 to 40 times as many sheep per square mile."[10]

There is much still to be learnt not only about the physiological rôle of the trace elements but also regarding the major inorganic elements (and related ions) in plant growth.[36]

Soil microbiology

Another scientific field still to be explored in greater detail is that of soil microbiology. Nicol states: "With some exceptions of limited practical application . . . it is true that, in spite of all technical ad-

vances, no large scale agricultural method of obtaining protein in bulk is known except through the agency of soil bacteria able to fix nitrogen from the air by virtue of their specific biological activities. These activities are exerted through the association of these specific bacteria with leguminous crops (legumes) such as the pulse crops (peas and beans) which yield seeds directly edible by man, and the fodder legumes such as clovers, lucerne and soya which, as green plant or hay, are the mainstay of most farm livestock supplying meat, milk and cheese for balancing the cereals and the rest of the starchy components of the diet."[36]

The same author has pointed out how the expansion of population in the U.S.A. and in the "old dominions" of the Commonwealth has been paralleled by the more intensive cultivation of leguminous plants which depend primarily on a phosphate as distinct from a nitrate fertiliser. This illustrates the need for achieving a better balance of crops in many regions of the world and work to this end has been carried out in many tropical territories.[15]

DOMESTICATED ANIMALS

Veterinary science in the broad sense of the term covers all aspects of breeding and feeding of farm animals; considerable advances have been made over the past few decades, both by parallelism with human medicine, by direct experimentation and by related work on laboratory animals. Much of this newer knowledge has been applied fairly rapidly; in some cases it has provided a scientific basis for existing farm practices, in other cases a corrective leading to improvements.

Thus work on animal genetics has led to improved breeds and crosses to give animals better fitted for their environment or with particular desired characteristics (*e.g.* high milk yields for dairy cattle);[19] the techniques of artificial insemination have been widely and rapidly adopted and can lead to rapid improvements in dairy herds and types of animals.[19]

Dune fixations and reafforestation are among the most important points of the F.A.O. programme in Libya. This photograph shows Mr. J. Moser, F.A.O. plant protection expert, and Mr. H. Martin studying the progress of diss (*Imperata cylindrica*) planted in small hedges in the sand to fix dunes. The dunes can then be used to grow various useful plants.

The science of nutrition has also been applied with good effect and in fact much of our knowledge of human nutrition (and of animal nutrition generally) has come from experiments on farm animals or (not unfrequently) from workers whose primary purpose was to improve feeding methods for livestock. It is paradoxical that far more quantitative information (*e.g.* for proteins or vitamins) now exists regarding the nutritive requirements of the cow or the pig than for man. This arises in part from the obvious difficulties of controlled experiments on man and in part from the economic importance of avoiding waste in farm feeding, so that manufacturers of feedingstuffs have taken a very active part in promoting both fundamental and applied research.

A body of knowledge regarding animal genetics and nutrition is now available for use in all countries and there is no reason why improvements should not take place leading to a more efficient use of animal feed to the ultimate benefit of man. Other areas of recent or current research may have far-reaching consequences, for example, the realisation that ruminants may utilise urea as a source of nitrogen (with a consequent economy of plant proteins) and the use of antibiotics in feeds.

Disease losses must be cut

Perhaps the most important successes will come from advances in veterinary medicine; the loss of livestock through diseases is formidable in all countries and in many tropical areas is the major factor hindering the rearing of dairy cattle and other animals. The newer chemo-therapeutic agents have already been applied with some success and much has been achieved indirectly by public health measures (such as malaria control by D.D.T. and other means) to produce in tropical areas an environment suitable for domesticated animals—as well as for man.[15] Research work to this end is a major preoccupation of pharmaceutical firms specialising in veterinary problems.

(To be continued)

The references denoted by numbers in the text will be published next month.

▶ Humidity controllers, both air operated and electric contact are the subject of a booklet issued by Negretti and Zambra, Ltd. Apart from describing the controllers, the accessories and auxiliary equipment which goes with them are also dealt with.

How is Flavour to be Judged?

By D. Sheppard, B.A., Ph.D.

Flavour, so important in food, is very elusive when one tries to measure it. A considerable number of experimental studies have been carried out, ranging from the stimulation of individual taste buds in physiological experiments to the vastly more complex business of comparing consumer preferences. The author outlines some of the principal findings at these different levels and draws some practical conclusions.

THE physiologist is concerned with what happens when a solution is applied to the tongue, and this simple level of sensation seems a good starting point for basic experiments on the sense of taste. The physiologist distinguishes between taste and smell, although taste, as commonly thought of in everyday life, involves both types of receptors. Thus it is said to be difficult to distinguish between the taste of an apple and an onion, if the person tasting them is blindfolded and holds his nose so that he cannot smell them. It is not possible to separate the two sets of receptors completely by such means, since some of the smell receptors will be stimulated through the rear opening joining the nose to the throat.

Smell and taste receptors

There are a very large number of smell receptors, more than there are for the sense of hearing. Various reasons for this have been suggested, such as the biological importance of the sense of smell in less unnatural living conditions, but a more likely explanation is that these receptors are so hidden away that there have to be large numbers of them for them to be effective at all.

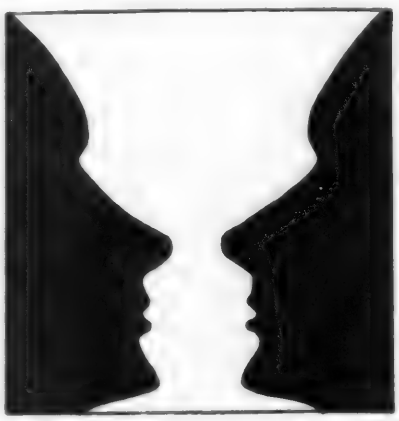
It is probably true to say that sensations deriving from the sense of smell alone have relatively little attention value as compared with other types of sensations, in so-called civilised communities such as ours. Yet the sense of smell can be very sensitive indeed, for it has been shown that the odour of ethyl seleno mercaptan can be detected at a concentration of two parts per trillion,[1] a concentration smaller than can be detected by any physical instrument so far designed.

Taste buds on the tongue have been classified according to their different functions and by their position on the tongue. Thus the receptors for the primary taste of sweetness are situated around the tip, and the receptors sensitive to bitter flavours towards the base of the tongue. Some types of receptors take longer to stimulate than others since they are situated deep down within grooves in the tongue.[2]

Texture and temperature also play their part in taste, and I can well recall asking members of a taste panel if they could recognise the taste of cheese in a liquid paraffin solution, and the difficulty they had in carrying out such a task with the texture so different to that usually associated with a cheese flavour.

Nerve impulses v. sensations

Though the picture on this page has nothing to do with taste, it gives a very clear example of the difference between nerve impulses and sensations. Most people see this as a "mistletoe situation," but it can also be seen as a chalice or a wine glass. The shapes and therefore the nerve impulses remain the same, even though two completely different interpretations are possible.



It has been the psychologist who has tried to classify the primary tastes and odours, and generally accepted classifications are as follows: for taste—salt, sour, sweet, and bitter; for smell—fragrant (violets), fruity (lemon), spicy (cloves), putrid (bad fish), resinous (pine) and burned (tar).

The term "gust" is used as a unit for the measurement of the intensity of taste,[3] most foodstuffs in common use having an intensity of 50 gusts, though pure lemon juice has an intensity of 100 gusts. I do not think much of "gust" as a word, but it is probably better than "organoleptic" which seems nowadays to be preferred to "sensory."

Vagaries in discrimination

Psychologists have put a lot of effort into experiments on sensory discrimination, and between about 1860 and 1920 these were really quite the rage. Much of this research was concerned with determining thresholds, or that stimulus difference which could be detected by a subject at a given level of certainty. Considerable research was done to try to account for peculiarities such as the finding that if two identical weights are picked up successively, the second one usually feels the lighter.

All this is not so far removed from practical applications as one

might think. For example, it was thought that judges who were particularly able to distinguish very small differences in the primary tastes and flavours would also prove the best when it came to distinguishing the more complex flavours in manufactured food products. Yet this is by no means always the case. Difference tests are commonly conducted with tasting panels, and the procedures used are much like those used by the psychologists when determining thresholds.

Thus one firm has discovered how much vanilla would have to be added to its product before consumers could taste it. In practice, it cannot afford to add that much, though it still adds quite a lot, for reasons that seem obscure. In the industrial field, a firm may only be concerned to know if a difference can be detected, using this evidence either to see that quality does not change (as in quality control) or when comparing two products to see if one is better than another.

In the latter case, a value judgment is called for in addition to the straightforward detection of a difference.

The usual procedure is to set up a laboratory tasting panel for quality control purposes, and a new product might also be submitted to this panel to see if its members could tell a difference between this product and its rival or predecessor. It is held, I think wrongly, that a laboratory panel cannot be used to give any reliable indication of consumer opinion. Whatever one's views on this, it is obvious that (provided the panel could tell a difference), the next stage is to try the product out on a sample of consumers.

These will be asked to say if they think the product is "poor," "good," "very good" and so on, perhaps after trying it out in their homes.

Such statements can be very ambiguous, and I once carried out an experiment asking people what they thought a "very rich" man would earn in a week.[4] The amounts given varied from £16 to £20,000.

Importance of flavour

It might seem that flavour is, by definition, the main item when buying food, yet considerations such as price, availability, keeping quality and nutritional value may all act as rivals to flavour. Generally speaking, however, more importance is attached to flavour than other aspects, as can be seen from a set of scoring systems used for cheese (Table 1).[5,6,7]

The systems do not agree very well, although it is probable that each system was drawn up with the "typical consumer" in mind.

What governs preferences?

To start at the simplest level, one does not need to be a physiologist or psychologist to conclude that we eat to live. What is less easy to decide is why certain foods are preferred to others. There have been experimenters who claimed to show that rats,[8] and babies,[9] can select quite suitable diets for themselves, suggesting that at a simple level, needs determine the diet, the choice being made, presumably, on a basis of taste or smell.

The nutritionist, somewhat incensed by this, points out that the children were not allowed the chance to select a poison; that a desire for change among what was offered could explain the apparently skilful choices; that a person with diabetes will kill himself with sugar; and that no one could seriously imagine that basic needs have anything much to do with the kinds of food chosen by adults in "civilised" communities.[10]

What can the physiologist say about preferences? It has been found that an increase in sweetness will make other flavours more apparent, and this is sometimes a cheaper way of improving a flavour than, for example, increasing the percentage of fruit extract in a drink.[11] Salt, as most people know, similarly enhances other flavours, and this characteristic has been used to advantage by some makers of processed cheese. The temperature of the product is important, and affects sensitivity. Thus, an ice-cream mixture is likely to be unpleasantly sweet before it is frozen.

It is worth mentioning here that there is one substance—phenylthio-carbamide—which tastes bitter to some people and neutral to others. Fewer people find that it tastes neutral but, for those who do, this appears to be an inherited characteristic.

On the borderlines of physiology and psychology, one can look for difference in flavour preferences associated with sex, or with age. Thus in some studies I carried out at the National Institute for Research in Dairying, it was found that girls at the age of puberty were far less keen on taking school milk than were boys, presumably because it tended to bring on feelings of nausea.[12] Both women and girls objected to flavoured milk primarily on the grounds that this was too sweet, but male subjects less commonly objected on these grounds.[13]

Adults are said to be less keen on sweet things than are children, and a possible explanation for this could be in terms of energy requirements. Older people are said to prefer stronger flavours, and this has been supported by some data from a Canadian survey of cheese flavour preferences.[14] However, a survey which I did on this topic in this country showed no such trend.[15] It would not seem unreasonable if such a tendency were to exist for, since hearing and eyesight get less efficient with age, why should it not also be true that old people require stronger flavours to stimulate their taste or smell receptors?

More certainly part of the psychologist's field of study are factors such as habit or fashion. Thus at coronation time a polytechnic prepared a red, white and blue cake, but with such colours it proved about impossible to persuade anyone to eat it. Social class may be important not only because the wealthy (like Marie Antoinette) can afford cake and the poor can only afford bread, but also because there are class-likes and dislikes.

Abrams[16] has made some play

with the idea that the upper classes in this country prefer slightly unpleasant or bitter things (such as coffee or marmalade) and eat things because they are "good for you." The working classes do not think about the nutritional aspect and like sweet things. Abrams[16] claims that the invention of a marmalade that tasted like jam was a great success since it had both snob-appeal and the right flavour to sell it to the working classes.

As previously mentioned, there is the liking for change, though note that this applies to fancy cakes, but not for bread,[17] or for cheese.[15] A curious feature of flavours and flavourings may be worth mentioning here—a school child tasting flavoured milk tablets[13] said, "These don't taste like real bananas, but they are just like penny 'banana chews.'" It is an interesting idea that consumers may be aware of two quite distinct types of flavours, even where these have the same name.

Table I. Scoring systems used for judging cheese

	AMERICAN CHEDDAR				ENGLISH CHEDDAR	
	Text-book by Slyke and Publow, 1921			*Text-book by Nelson and Trout, 1934*	*Catalogue of British dairy Show, 1956*	*British National Association of Creamery Proprietors (system now used by Grading Service)*
	Export cheese	*Home-trade cheese*	*English market*			
Flavour ...	45	50	35	45	50	45
Texture ...	15	} 25	15	} 30	15	} 40
Body ...	15		25		15	
Colour ...	15	15	15	10	10	5
Appearance (finish)	10	10	10	15	10	10

Flavour v. other considerations

Considering now the practical issues in the food industry, what is the relative importance of flavour compared with other sensations?

Cheese judges, as an example, attach more importance to flavour than to appearance. Now such judges are "experts," and not only do they often feel that they know what consumers want, but, if you show them they are wrong, they reply that the consumers therefore need educating.

Quite apart from that, if you ask an expert on what basis he makes his quality judgments, he will tell you, say, that he considers the texture, feel, smell, taste and appearance of the sample in question. Yet a detailed examination of his assessments may often show that one sensory mode is predominant and that the other qualities which he assesses scarcely affect his final judgment.

Similarly, the consumer will often be wrong if you ask him which quality matters most to him, and there are many experiments which show this. Seeing is what really matters, for a chocolate-coloured cake with lemon flavour will taste of chocolate: likewise, a red flavoured milk will taste of strawberry or, less often, of raspberry, even when the flavouring is cherry. I have never tried putting green glasses on cows to see if their hay then tasted like grass, but I sometimes can well believe it would work.

Something other than a conflict of sensations happens here; preconceptions obviously matter, and we soon discovered that red-flavoured milk tasted like strawberry because that was the flavour that our victims expected.[13] We also found that a popular commercial ice-cream was considered to be more creamy than one which really contained cream—probably because the consumers concerned had been conditioned to liking the former brand.[18]

Again, when you test consumers' ability to distinguish between margarine and butter, a very great many people cannot distinguish them. Yet 89% of housewives said that they could tell the difference—though often they remarked that others in their family could not.[19]

Presumably this is just one more case where it is easy to tell the difference when you are the one to open the packet. I should add that, even in a very difficult test, a greater than chance proportion of consumers can tell the difference, although nothing like 89%. Advertisements for margarine, naturally, stress the fact that fewer can tell the difference than think they can.[20] Social prestige may be important, and it is often said that butter gains over margarine for this reason more than for any other. Margarine advertisements seem to set out to encourage this view by taking the line "this margarine tastes just like butter," and by adding 10% of butter, or perhaps "gallons and gallons of fat-free milk" (a pleasant way of saying skimmed).

Cost, nutritional value and advertising

Cost presumably matters when choosing oysters rather than winkles, but consumers often do not notice smaller differences. Thus little more than half of the housewives in a recent study realised how little weight they purchased when buying cheese in a processed form.[15]

Nutritional value probably is not of great importance, though its negative aspects may be. Thus consumers seemed more aware that butter or milk might be fattening, than of its real value as a food. There was a curious conflict, too, between the appeal of a home-made or "natural" product and the appeal of factory-made products which were thought to contain less good ingredients but to be produced more hygienically.[21]

No doubt it is unnecessary to stress the importance of advertising, but there is at least one experiment which shows that the more expensive perfumes are not always preferred when their names are not shown.[22]

A more dramatic test of the effect of suggestion occurred when a lecturer opened a bottle of distilled water in the front of a class, telling them that it contained an unpleasant odour. The experiment had to be discontinued be-

Table 2. Relative importance of factors influencing housewives' purchases of dairy products

	Cheese (Cheddar)	*Butter*	*Milk*	*Cream*	*Ice cream (in home)*
Flavour	* * *	* * *	* * *	* * *	* *
Type	* * *	* *	* * *	* *	* * *
Price	* *	* * *	* *	* * *	* ?
Negative health aspects	* *	*	* * * ?	* * ?	* *
Nutritive value ...	* *	* *	* * * ?	—	* *
Availability	* *	—	* *	* *	* *
Keeping quality ...	* *	—	* * ?	*	* * ?
Texture	* *	*	* *	* ?	* *
Age of product ...	*	*	*	*	* ?
Social status value ...	—	* ?	—	* ?	—

Where * * * = considerable importance (where "measurable," applies for over 50% of the group).
* * = some importance (where "measurable," applies for 10%—50% of the group).
* = insignificant importance (where "measurable," applies for less than 10% of the group).
? = value quoted could only be inferred, or appears self-evident.
— = no fair estimate of value was possible.

fore the "smell" reached those at the back of the class, because it was by that time affecting those at the front so badly that they were having to leave the room.[23]

Table 2 shows the results of an attempt we made to outline the factors important to consumers in their purchase of dairy products.[24] Although sketchy, to put it mildly, such "profiles" serve to show how different, in these results, a number of food products can be, even when derived from the same basic material.

Warnings and "don'ts" for manufacturers

First of all, don't assume that experts really know what the consumer wants.

Secondly, if you run a tasting panel, don't expect unbiased judgments from four members of the junior staff when the fifth member is one of the Directors.[25]

Thirdly, think twice about the results obtained from a consumer survey if it shows that adding a flavouring to a food product makes 85% of consumers like it,[26] when there is published evidence to show that only 50% of consumers like the raw product.[27]

Fourthly, because you know that a taste panel serves a useful purpose, do not imagine that to mention this in your advertisements will similarly impress your non-scientifically minded consumers.

Fifthly, don't assume that because a consumer can't tell product A from product B when asked to taste them under a sodium light in a laboratory, that taste is not important. What matters is if he *thinks* he can taste a difference. I disagree here with Abrams[28] who says that if product A is preferred it must be obviously better than B; all that is necessary, really, is that product A is not obviously *worse* than B, for, if this were so, the consumer could not then kid himself that product A is the better.

Finally, when savouring remarks like the following, add a pinch of salt: "when interviewees told us they considered the flavour the most important thing about ice-cream, they were giving us only a symptom. The function played by ice-cream in their lives stems from the whole emotional aura of voluptuousness, childhood experiences and uninhibited over-indulgence."[29]

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Infestation Control

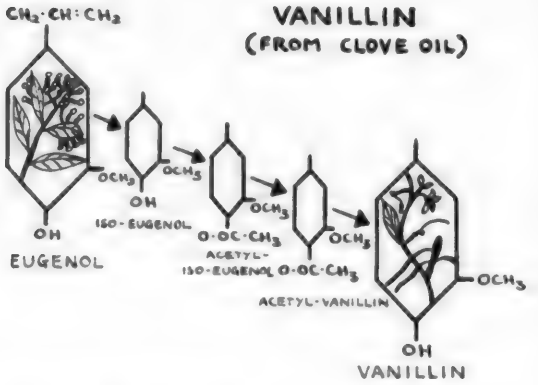
FARMERS, seed merchants, millers and many others connected with agriculture and the food trade will welcome a publication* from the Ministry of Agriculture, Fisheries and Food, which gives an account of the scientific work undertaken by the Infestation Control Division of the Ministry in the field of research into ways and means of controlling these pests.

This attractive and well-illustrated booklet describes fumigation and other modern methods of dealing with stored products, insects, new methods for controlling rats and mice, and the measures now in operation for the control of land pests.

* *Infestation Control. A Service to Agriculture and Food Storage.* 1958. H.M.S.O. 32 pp., 12 plates. 4s. net (by post 4s. 5d.).

Improving

Flavour, Colour and Texture



A FOOD MANUFACTURE survey of additives

Flavouring essences ★ flavour enhancers and seasonings ★ spices ★ colours ★ emulsifiers and stabilisers ★ sausage additives ★ antioxidants

Flavouring essences

AN essence is usually regarded as "an extract obtained by distillation," and although products meeting this definition are still manufactured, a much wider range is made possible by the use of synthetic materials. Most synthetics are of enormous strength, and their full value is appreciated only on dilution. Many of the synthetics made today exist also in nature, but in their natural form they always occur together with other aromatic substances which markedly modify their flavour; examples are benzaldehyde and vanillin, which occur respectively in the volatile oil of bitter almond and vanilla beans.

Flavours can be divided into two categories: those registered by the taste buds of tongue and palate, responding to the qualities of saltiness, sweetness, sourness and bitterness; and aromatic flavours such as those originating from fruits, flowers and animals. The latter kind, being volatile, are perceived by the sense of smell, which accounts for the fact that to a normal person taste and smell are inseparable.

At one time the only flavours available were of natural origin, such as spices, herbs, honey, fruits and flowers; later it became possible to extract the flavouring constituents, mostly in the form of oils, now known as essential oils. An example is lemon.

The start of commercial production some 70 or 80 years ago of synthetics such as esters, alcohols, aldehydes, ketones, lactones, etc., greatly increased the variety and possible combinations of flavours.

As received by the food manufacturer, flavours are usually blends of natural or synthetic materials, or both, dissolved in a suitable solvent. For preparing dry mixes, such as custard and blancmange powders and cake mixes, flavours in dry form sealed for protection against oxidation are available.

Flavours are most commonly used singly, *e.g.* lemon, orange, raspberry, strawberry, Madeira cake flavour, etc., but an original and pleasing result can often be obtained by blending two or more. Fruit flavours do not usually blend well with non-acid flavours such as vanilla, maple, honey and caramel. Blended flavours should, therefore, be of similar type, *e.g.* lemon with orange, vanilla with maple. Mixing of two or more essences is inadvisable; the appropriate proportions should be added separately during the creaming stage. Butter flavour is intended to add the flavour of butter when compound fat, margarine or even butter is used, thus providing a background to which other flavours may be added. It should, therefore, be added sparingly.

Flavours are volatile, and some loss during processing is inevitable. They should, therefore, be added, where possible, after the application of heat and at as low a temperature as is compatible with thorough incorporation.

Among established flavour manufacturers, the firm of W. J. Bush and Co., Ltd., in the course of their 108 years' existence have built up an organisation which extends to all parts of the globe, and their many overseas interests include factories in Australia, Canada, India, New Zealand, and South Africa, and their depots and agents extend throughout Europe and the Middle and Far East. They manufacture a very considerable range of materials for the food, pharmaceutical and fine chemicals, cosmetics and perfumery, mineral water and beverage, ice cream and dairy industries. Their range of products for the food industry can be divided into groups according to the processing conditions and the purpose of the final product. The baking industry requires flavouring and colouring materials which can withstand high temperatures and yet can be used equally well in cold mixes, such as buttercreams and icings of all types. The No. 1 Series of

flavours is typical, as are the *Permicol* Harmless Food Colours in liquid and powder forms. *Natural Orange and Lemon Pastes* for use in baked goods are recent introductions, and are claimed to give the distinctive flavours of the fresh fruit without the problems of storing and preparing the fruit in the bakery.

Similarly, the biscuit manufacturer, in addition to flavouring biscuit shells, requires flavours and colours which do not give rise to rancidity in a biscuit cream, and for this there is a choice of either powder or liquid flavours and a special range of *Non Speck* colours.

The essential oils of lemon and orange are of particular interest to the baking industry, and the makers say that only the finest selected oils are considered for the *W.J.B. Speciality* range. The sugar confectionery industry uses a wider range of these essential oils for citrus fruit boilings, peppermint lines or any sweets having a particular sale during the winter, for which aniseed, clove, cassia and eucalyptus oils are perhaps the most popular. Where the true flavour of the fresh soft fruits are desired, the makers say their *Eesi-Flo* fruit concentrates are most suitable, being based on the concentrated juice of the fruit concerned. Alternatively, say the makers, the *Witham Series* of flavours give excellent results at a considerably lower cost, as will the long-established *36 Series* specially prepared for boiled goods.

Buttabelle is said by the makers to be a versatile butter flavour suitable for toffees and caramels, or any product which is required to have the background flavour of fresh dairy butter. Similarly, Bush Vanillin 100% is said to be used extensively in all types of chocolate work and many other food products. Detailed recommendations for the use of these and many other speciality lines for sugar confectionery work are given, together with innumerable recipes, in the 13th edition of *Skuse's Complete Confectioner*, published by W. J. Bush and Co., Ltd.

Packed foods and dry mixes require special consideration, having regard to their considerable shelf life and varying storage conditions. Custard and blancmange powders, jelly crystals, cake and sponge mixes, powdered soups, lemonade powders, etc., must retain their freshness and fullness of flavour up to the moment of reaching the table. The special process involved in the manufacture of *Tru-Sil* locked-in powder flavours is claimed to ensure this and to prevent undesirable off-flavours developing which might occur with liquid flavours through oxidation and prolonged storage.

Rayner and Co., Ltd., say that they are continuing their research on their *Constant Cloud* type of emulsified flavours, with a resulting finer dispersion of the essential oil in a much improved stabilised aqueous medium. The use of these flavours in beverages is claimed to eliminate all danger of the "ring" which used to be a feature of many emulsified flavours, so long as care is taken in the compounding of the final product. The makers have found it unsatisfactory to attempt to supply a standard product for a wide range of soft drinks, and their laboratory supplies special gravities for many unusual products.

Flavour enhancers and seasonings

The *Protex* range of hydrolysed proteins manufactured by Fredk. Boehm, Ltd., are designed to enhance savoury flavour and to improve meat aroma. Various grades are processed from animal and vegetable proteins, and they are available in paste, powder and liquid form. The makers say they are extensively used for dry soup mixes, canned soups and meats, and gravy powders.

Yeatex, made by the same firm, is a yeast extract designed to impart a rich savoury flavour and to enrich foods with vitamins of the B group and with amino-acids. The makers say it possesses a bland flavour and buttery texture making it invaluable as a food additive and as a spread or beverage in its own right.

This firm's *Aji-No-Moto* brand of monosodium glutamate is claimed to be the largest selling brand in the world and to be used in almost all processed foods in this country. It is designed to bring out and emphasise food flavours and is said to be of particular use in canned soups, soup mixes, canned meats, meat and fish pastes, canned fish products, sausages, quick-frozen foods, and all foods except jams, dairy products and some vegetables. It is available as pure crystals (99%+) and is water soluble.

A seasoning mix for sausages designed by Mr. Hilgeland of Foodtech, Ltd., to suit the British palate has, so the makers say, been exhaustively tested by being offered to the public at several food exhibitions throughout the U.K. As a result, *Primamix* was developed and has been found to be suitable for all tastes. It is claimed to have a balanced formula and to contain special ingredients to ensure smooth, even texture and colour in sausage products; products embodying this seasoning will, it is said, have the true meat flavour and will not shrink.

A special frankfurter *Primamix* based on the original seasoning used by Mr. Hilgeland's father in 1910, is available. A further development is hamburger *Steakletmix* embodying all the ingredients of the original hamburger seasoning for use with the currently popular steaklets.

The firm say that they can, in fact, supply the correct seasoning for any one of more than 30 different kinds of sausages and similar products together with recipes and production methods if required.

Spices

Spices are among the most widely used of flavouring ingredients, but being natural products their variability is a disadvantage. A practical alternative is to use the highly concentrated flavours of the essential oils derived from them, but the flavour quality of these compared with that of the whole spice is often inferior. Stafford Allen and Sons, Ltd., say that their range of *Saromex* spices

completely overcomes this difficulty. These products, it is claimed, retain the full natural flavour of the whole spice by a special extraction process which incorporates it into a sterile fibre-free base. By careful analytical control the flavour value of these spices is kept constant, enabling them to be used in a controlled manner consistent with modern technological practice. These spices may replace normal spices weight for weight in food; the makers claim that they have the following advantages: constant flavouring value; freedom from bacteria and mould spores; absence of lipase enzymes; and freedom from cellular matter and all types of contamination often found in normal spices. The makers also say that the total flavour for a given amount of spice is instantly available, whereas in natural ground spice as much as half of the total flavour may remain within the fibrous tissues and so contribute little to the flavour of the food. Because of this, this type of spice may lead to reduced overall usage of the spice ingredients.

Colours

Colours available for food products may be natural or synthetic, although natural colours have by now been largely superseded because synthetic colours in general provide greater variety, brilliance, stability and uniformity, and have much greater tinctorial strength. In most countries, "permitted lists" of colouring matters are in force; the first British permitted list appeared in 1956. Official definition of the degree of purity is less common, and only a few countries (notably the U.S.A.) enforce strict purity specifications. Similar specifications are being considered by the British Standards Institution.

As with flavours, care should be exercised in the use of colours. Highly coloured foods are much less attractive than those with delicate tints. The colour should be complementary to the flavour used. Uniformity of flavouring and colouring is important, as goodwill can often be lost by the careless use of colours and flavours. In considering the cost of raw material in any food product, it is fallacious to base calculations on the cost per lb. of colour and flavour. Choice should be determined by the quality and concentration of these two ingredients, since it is the cost per lb. of finished product which is all important.

The *Edicol Supra* range of colours made by the Dyestuffs Division of Imperial Chemical Industries, Ltd., consists of 15 of the 29 colours permitted in Britain and covers the major requirements. There are also two "non-permitted" colours intended for export purposes, and a number of mixtures of permitted colours. All are manufactured to strict purity specifications which have anticipated the proposed B.S.I. specifications since 1951, and, where applicable, they conform to the U.S. regulations for F.D. and C. colours. The colours in this range differ considerably in solubility, and in stability to the wide variety of conditions encountered in the food industry. Thus, although *Edicol Supra* Tartrazine NS is a universal yellow, very soluble in water and with satisfactory stability to heat and light, and to the reducing conditions, acids, alkalis, etc., which may be encountered, there is unfortunately no other *Edicol Supra* colour with the same good all-round properties. Selection of the most suitable product for a given set of conditions is, therefore, necessary. As an example, both *Edicol Supra* Ponceau RS and 4RS would be suitable for canned strawberries, but the former is more stable under reducing conditions, *e.g.* in sausage, and the latter at high temperatures, *e.g.* in baked goods.

Although the vitamins are well known as essential food factors, they have other functions; some vitamins, or their precursors or analogues, can be added to improve the colour of processed food and drink. Here they may act in two ways, either directly as a colour themselves or indirectly by enhancing and maintaining the colour already present.

The use of beta-carotene, or provitamin A, is now well established. The yellow colour of this substance has long been well known in butter, cheese and carrots, but although it was first mentioned in 1831, it was not commercially available by synthesis for 120 years, when it soon became widely accepted as a colour for margarine. Its very low solubility has been largely overcome, and its use, say the suppliers, Roche Products, Ltd., is spreading rapidly to beverages, cake mixes, cheese, salad oils, ice cream and butter, where indeed it occurs naturally but at fluctuating levels.

The successful application of beta-carotene led the research team of Hoffman-La Roche to attempt the synthesis of many other carotenoid pigments. Lycopene (a red in tomatoes), zeaxanthin (in yellow corn), and canthaxanthin (in mushrooms) among many others have been synthesised and are now being tried as food colours. The Egg Marketing Board is being pressed to improve the colour of egg yolks, and it may well be that the supplementation of poultry feed with a carotenoid will provide the solution.

In the second category, that of enhancing the colour already present in a food, ascorbic acid or vitamin C is now widely known. For example, fruit juices become dull and unattractive in the presence of atmospheric oxygen. But ascorbic acid is highly sensitive to oxidation, and therefore, by actively competing for the available oxygen, its addition to fruit juice or freshly cut fruit markedly retards the browning tendency. Similarly, ascorbic acid will help retain the desirable red colour of freshly cut meat which would otherwise soon become an undesirable brown colour when exposed to the atmosphere. In cured meats, ascorbic acid is used by the ton, say the company, for better formation and retention of the typical bright red colour.

Emulsifiers and stabilisers

S.A.T.I.A. carragheen extracts made by Fredk. Boehm, Ltd., are pure extracts from certain seaweeds processed under rigorous chemical and bacteriological con-

trol. They are manufactured in a large variety of grades and are claimed to provide an almost unlimited range of stabiliser properties in foods. The makers say that apart from imparting viscosity in aqueous solutions, they are of use in the manufacture of cold mix instant puddings, ice cream, ice cream powders, piping jelly, pork pie jelly, minced poultry foods and bakers' sundries.

The range of lecithins supplied by this firm is designed to provide texture improvers for the confectionery and baking industries. Lecithin possesses very good emulsifying properties and is of use wherever fat stabilisation is required.

Cremodan emulsifying agent for ice cream is a Danish product supplied by Jacobson Van Den Berg and Co. (U.K.), Ltd., which is claimed to be a more efficient emulsifier than those of the glyceryl monostearate type because of its more powerful water-binding properties. It is claimed also to produce an ice cream which leaves the palate clean, with no masking of natural flavours. It is double refined and deodorised, and is completely neutral in flavour and odour. It is also said to allow a finer and more stable air dispersion. Other special emulsifiers supplied by the same firm are *Toflan* for caramels and toffees, *Homodan* for bakery products and margarine, and *Famodan*, a fat modifier and bloom inhibitor for chocolate.

Soya flour is available from Soya Foods, Ltd., in two principal forms: unprocessed soya flour, which is prepared by grinding the beans after removal of the husk, and retaining all the natural enzyme activity and characteristic flavour; and debittered soya flour, prepared by a similar process including in addition a heat treatment to inactivate enzymes and remove the beany taint.

Although the debittered product is of immediate concern in the improvement of texture, many of the remarks apply with equal force to unprocessed soya flour.

Debittered soya flour, say the firm, has a slightly sweet and nutty yet bland flavour, which is masked by the natural flavour of most foodstuffs. A typical analysis is:

moisture	8%
protein	40%
oil	18%
phosphatides	2% (as lecithin)
sugars	8%
other carbohydrates	18% (no starch)
fibre	1·81%
ash	4·5%

Part of the essence compounding room at the factory of W. J. Bush and Co. at Ville Lasalle, Montreal.

The analysis shows that soya flour is ideally constitued to act as an emulsifier and stabiliser in a wide range of foods. The phosphatide fraction (known commercially as lecithin) acts as an emulsifying agent in the formation of both oil-in-water (*e.g.* salad cream) and water-in-oil (*e.g.* margarine) emulsions. The large amount of protein serves to stabilise the emulsion. In this manner, soya flour has a beneficial effect on the texture of cream soups in which a smooth, stable creamy emulsion is required. In the manufacture of sausages, soya flour is employed as an emulsifier and stabiliser or binder. It improves the texture of the raw sausage by preventing "weeping" and helps to hold the fat in stable emulsion during cooking.

In many bakery products, soya flour is claimed to promote a finer and more even grain in the crumb structure. Cakes and sponges become less crumbly and more resilient while retaining moisture and tenderness through the water-binding capacity of the soya protein and carbohydrate fractions. This is of particular importance with slab cakes which are sliced for sale.

British Soya Products, Ltd., have developed a range of soya specialities over nearly 30 years. *Bredsoy*, an enzyme active form of pure soya, is an old-established ingredient of bread throughout the British Isles, they say. It is claimed to confer improved volume, texture and colour on the crumb of the loaf by a combination of protein, essential fatty acids and lecithin with the unique enzyme system of the bean. The oxidase enzymes not only strengthen the gluten but bleach the xanthophylls, while the thermostable beta-amylase raise the reducing sugar content by as much as 50% during baking. These, and other complex changes in the processes of fermentation, result in a loaf of markedly increased staling resistance, *i.e.* retention of freshness in texture and flavour.

Even more effective in this direction, it is claimed, is the more recent product *B.S.P. Improver*, a modified form of *Bredsoy* combined by a special process with crumb softening and other ingredients which enhance the benefits of the natural soya. *Scotia* and *Banfin* are variants of B.S.P. Improver developed to meet the specific requirements of batch bread in Scotland and Ireland.

More recently still the company have successfully marketed *Bunkum*, a soya based product designed especially for bun doughs

with their higher fat and sugar contents and short fermentation times, and *Goldcrum*, an improver of brown bread texture which is claimed to overcome the rapid development of harshness that is so well known an objection to wholemeal bread.

The latest addition to the company's range, introduced at the Bakery Exhibition last October, is called *Cruet*, which is claimed to improve greatly the texture and colour of the plant-made crumpets that are meeting increased demand throughout the country and to add 2-3 days to their shelf life. It also is based on soya of modified enzyme activity designed to suit the batter process used in crumpet plants. *Cruet*, like its fellows in the B.S.P. range of bakery ingredients was developed in close association with large scale bakeries.

Canned and packeted soups, meat products and sauces and beverages benefit, they say, in texture, colour and stability from full fat soya in its processed or debittered form, as do cakes and biscuits and sugar confections. Here enzyme activity is undesirable and the firm's product *Trusoy* is processed to the highest degree compatible with an acceptable colour and flavour. The complete stability of its protein-fat-lecithin complex improves emulsification of other fatty materials, and its natural content of gamma- and delta-tocopherols, the most potent antioxidants of the series, is of great advantage. In packet foods especially, the makers say that the use of *Trusoy* as the sole source of fat avoids the risk of oxidative or lipolytic rancidity.

Perhaps the greatest advantage of soya is that it is itself a natural food exceptionally rich in protein and fat. The technical advantages it confers are, therefore, obtained with an increase in the nutritive value of the product and without the fear of toxicity that may accompany synthetic substances.

Edifas A and *Edifas* B are cellulose ethers made by the Nobel Division of Imperial Chemical Industries, Ltd., which are said by the makers to be extensively employed in the food industry. The first is a methyl ethyl cellulose with powerful foaming and emulsifying properties, and the second, a sodium carboxymethyl. cellulose, is claimed to be a most efficient emulsion stabiliser. The first, available in three grades, is also a versatile thickening, suspending and binding agent.

Their most important application, say the makers, is in the preparation of liquid emulsion imitation creams, in which the two together give an admirable emulsifier/stabiliser system. A similar combination is used for hardened ice creams of good texture and taste. The makers say that there are many other established uses for these products in baking, confectionery and catering. The new powdered forms can be used as ingredients in base powders for imitation cream and ice cream, and in dry mixed powders for general bakery and confectionery purposes.

Sausage additives

One of the main problems which faces the manufacturer of fresh sausages is that of attempting to keep the colour of the fresh sausage attractive and appetising during storage before being cooked by the consumer.

There seems to be little doubt that one of the first factors which influences the rapid discoloration of fresh sausage is the bacteriological process due to overheating of the chopping and insufficient cooling during the critical first 4-5 hours after stuffing. Fortunately, this post-stuffing/cooling phase can now be dealt with quite successfully by the use of the now familiar cooling and drying chambers. However, the deterioration due to discoloration does not, unfortunately, end with the correct cooling and drying.

Another contributory factor towards the discoloration of fresh sausage is insufficient fat correctly emulsified into the mix and also incorrect balance of moisture to the other ingredients.

Unfortunately, several manufacturers are unable to use a reasonable complement of fat since they have found that the fat tends to fry out on cooking, thus leaving a shrinking sausage in the pan, accompanied by a distinct loss of weight. This can now be overcome, say the Oppenheimer Casing Co. (U.K.), Ltd., since the introduction of animal protein supplement, such as their *Gervita*, now enables a fair complement of fat to be used in the mix without loss on cooking and also enables the fat to be added in a truly emulsified form.

The emulsion, which comprises *Gervita*, water and fat, is claimed to enhance greatly the colour of the fresh sausage since the emulsion itself is, by nature, light and creamy, and will make the colour of the sausage itself light, creamy and attractive.

Another interesting but important fact is that one of the stages of discoloration of the fresh sausage is the surface drying during the first 36 hours of storage. This tends to give a slightly darker appearance to the sausage, but this can again be overcome by the use of the *Gervita*/fat/water emulsion.

The makers say that tests have shown that this onset of darkening of the fresh sausage is retarded by, in most cases, 36 hours and, in some cases, even as much as 48 hours. Since, as already mentioned, the incorporation of the fat into the mix in the correctly emulsified state enables the fat to be retained during cooking, it means that a more nutritional sausage results after cooking.

The makers say that the addition of a correctly balanced additive to the mix also greatly improves the texture of the sausage by its complementary action in fortifying the binding qualities of the meat, achieving superior texture and overall character of mix. The makers say that it is important that the correct type of phosphate be used in conjunction with *Gervita*, and that in order to obtain best results, their new instant additive *Hy-Phos* should be used.

Tests carried out on Continental goods in 1939 by Mr. Hilgeland showed big improvements in texture, keeping qualities and colour when phosphates were added, say

Foodtech, Ltd. From the well-known use of phosphates in cheese products, he developed the idea of producing a liver sausage with a high fat content. Seventy-five per cent. of fat belly of pork and 25% of fresh pig's liver were used and 5 oz. of phosphate mix added to every 100 lb. of this mixture. The result of the first test was outstandingly successful, which prompted Mr. Hilgeland to carry out further tests with frankfurter mixes and frying sausages, when the same excellent results were achieved.

From then on the special mixture was used in nearly 30 different kinds of sausage goods, and it is said that this mix improved all canned goods such as canned frankfurters, beirwurst and schinkenwurst, which are similar to a high-class English luncheon meat or the American "spam."

Further tests were carried out on fish products, and as a result, say the makers, some of the leading European fish canners incorporated the mix into their products, samples of which won the approval of Government food authorities.

The original phosphate additive was named *M.S.B.* (*M*eat processing, *S*ausage manufacture, *B*acon curing), and has been manufactured in this country since 1952; since that time, say the makers, it has become widely used both in this country and abroad.

Antioxidants

Now that the antioxidants butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT)/n-propyl, n-octyl, and n-dodecyl gallate are officially approved in Britain for preserving edible fatty products, food manufacturers are building up considerable experience in the techniques of incorporating these substances in food products.

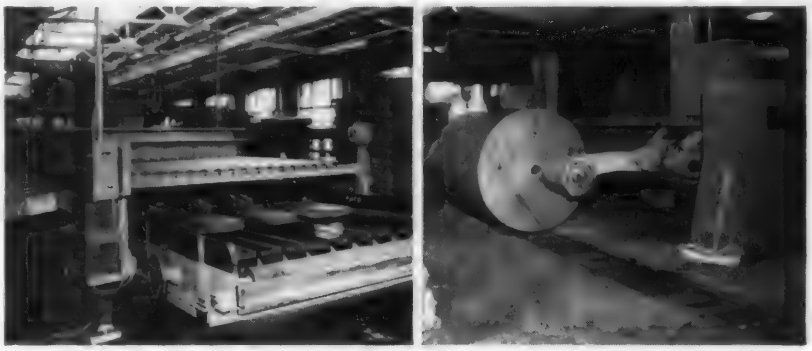
It has been found that the amount of protection varies with the nature of the product and its conditions of use, but in general, the addition of only 0·01% to fats and oils will give a satisfactory degree of stabilisation. This concentration of BHA in lard, for example, will increase its shelf-life from a few months to two to three years. Where fats and oils are in continuous use, as in "heavy duty" frying, the concentration required is 0·02%. This will normally double their useful life. The antioxidant should be added as early as possible in the life of the oil: in the case of animal fats, immediately after rendering; in vegetable oils after refining; and in essential oils, after extraction. No antioxidant will, of course, restore freshness to a product which has already deteriorated.

Among these preservatives, BHA has the important advantage of "carry through." Being stable at baking and frying temperatures, the antioxidant effect is retained after cooking and lengthens the shelf-life of the final product. BHA appears to be superior in this respect to BHT and certainly to the gallates, though in combination there appears to be a synergism between BHA and other primary antioxidants such as BHT, the gallates, and organic acids such as citric acid.

May and Baker, Ltd., manufacturers of *Embanox* brand food antioxidants recommend adding these products as a pre-mix. This method is convenient for all fats and oils and for candy and pastry mixes. A uniform distribution is essential and is more easily attained if the preservative is dissolved or diluted in part of the fat or oil and then added to the bulk of the food material in this form. The liquid formulations of the antioxidants have advantages over the solid form in being easier to handle and disperse.

At present regulations in Britain do not permit the use of food grade antioxidants by any means other than direct addition, but in some countries food may be preserved by spraying, brushing, dipping, and for foods such as bacon, ham or fish, by injection.

More Paperboard for the Food Industry



Reed Corrugated Cases, Ltd., have recently brought into operation a new board machine at their Brentford, Middlesex, branch. Over 300 ft. long, it incorporates the latest refinements in design and will, it is claimed, enable the factory to increase its production of wide corrugated fibreboard by many millions of square feet per week, with the double effect of meeting an ever-growing demand and cutting down delivery times.

Roller conveyors and turntables facilitate movement of the paper reels to the shaftless reel stands, which have push-button controls to enable the reels to be positioned quickly and precisely. Where the blanks come off the machine, electronic counters allow them to stack until a pre-set number is reached. These are then automatically moved forward to let the next stack form. By means of the duplex rotary cut-off, blanks of the same board quality, but of different dimensions, can be produced at the same time. This, say the makers, means quicker delivery for customers, as different orders can by careful pre-planning be dovetailed into the schedule for simultaneous production.

The pictures shows (left) *how stacks of a predetermined number of blanks are automatically moved forward and to make room for the next stack and* (right) *one of the shaftless reel stands which give finger-tip positioning of the reels.*

Machinery and Equipment

TRIPLE EFFECT EVAPORATOR

Tunnel Glucose Refineries, Ltd., have just installed a new type of triple effect evaporator for use in the production of their enzyme-converted liquid glucose, *Sweetose*. The evaporator is manufactured by the A.P.V. Co., Ltd.

This is said to be the first time an evaporator of this type, normally used for milk evaporation, has been used in glucose production.

Special features claimed for the evaporator include: short transit time: the evaporator is constructed to allow glucose to pass from the inlet in the shortest possible time, thus avoiding large quantities of liquor being retained, a great advantage when the evaporator is cleaned; the capacity of the evaporator can be greatly increased by adding to the number of plates within the framework; compactness and standing legs enable the evaporator to be erected anywhere; there is no complicated supporting structure; high efficiency horizontal separators; the plates are very closely placed with a film of the syrup on one side and steam on the other side; large stainless steel doors fitted with wing nuts enable easy access for cleaning and maintenance.

The evaporator is constructed of stainless steel throughout.

A triple-effect evaporator made by the A.P.V. Co. which has been installed by Tunnel Glucose for use in the production of "Sweetose".

DRUM STACKER

Barron and Shepherd, Ltd., have introduced a new mains-powered drum stacker. The stacker, which has a 3-phase electric motor driving a hydraulic pump and ram, lifts a 50 gal. drum to the required height in a few seconds at the press of the push button control. The stacker head is lowered by manual operation of the pressure relief valve.

An isolator is fitted to cut off the mains power and the unit is mounted on 4 in. wheels and castors with roller bearings.

THERMOMETER SPEAR

A thermometer has been developed for taking temperatures within a mass of frozen fish aboard fishing vessels, road and rail vehicles, and in other difficult sites. It consists of a spear-like probe, made of a 1·8 mm. hypodermic needle, connected by a flexible lead to a compact indicating unit.

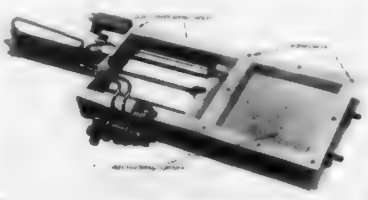
The instrument should be applicable to many requirements for measuring temperatures within a mass of material under field conditions.

The prototype has a range of −30 to +70°F. with an accuracy of about ±0·2°F.; other ranges could be provided very easily. The sensitive element consists of a 46 S.W.G. copper wire wound on a glass former within the hypodermic tube. The indicating unit is a Wheatstone bridge with a balance control directly calibrated in temperature.

The instrument, which was developed at the Torry Research Station (D.S.I.R.), Aberdeen, is thought to be both reliable and inexpensive.

POULTRY PROCESSING

What is claimed to be the largest poultry processing and packing station in Europe, the new plant of Western Poultry Packers, Ltd., at Sutton Benger near Chippenham, Wiltshire, has almost doubled its production in the course of a year.

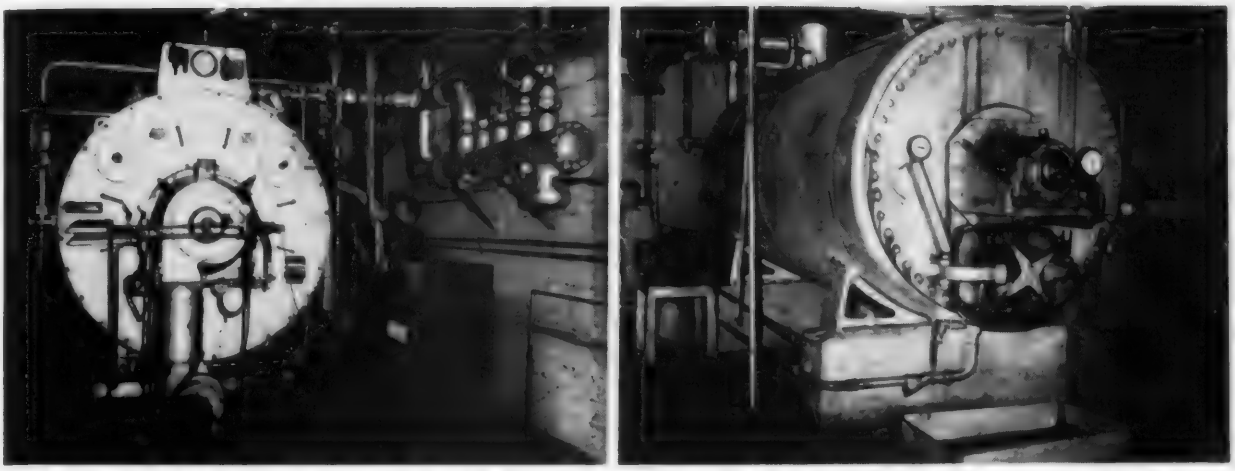


A pneumatically operated slide made by Lindars Automation, Ltd.

The plant is highly mechanised to achieve continuous production. Steam power for processing and heating is provided by a model 150 *Powermaster* packaged automatic oil-fired boiler made and installed by G. W. B. Furnaces, Ltd. This produces 5,175 lb. of steam per hr. This firm supply a range of 16 similar boilers of different sizes.

The main operations which take place in the packing station are as follows. After electrical stunning and killing, the birds pass through a bleeding tunnel, a soft scalding tank, and then through a series of automatic plucking and quill pulling machines before being finally plucked, singed and washed. They are then removed from the conveyor line.

After being graded and weighed on a special scale, the birds are transferred to the evisceration line. There, they pass above a stainless steel trough through which a constant stream of water is running. Gutting of the birds takes place and edible offal is conveyed by water to the giblet wrapping section. At the end of this line, the birds' heads are removed automatically, the necks are cut off, and the birds travel through a second washer. All waste is directed to the by-products plant. The chickens are stored for approximately 6 hours in a series of mobile chill tanks in which the body



Two items of plant at the poultry processing plant of Western Poultry Packers, Ltd. (*Left*): **Model 125 Powermaster boiler which produces steam at 100 p.s.i.** (*Right*): **The pressure cooker, supplied by Wm. Douglas, Ltd., which processes the waste materials.**

heat is removed. After chilling, the birds are hung for 20 minutes on a drying line before being transferred on the 2-tier trussing and packing conveyor tables, or to a cut-up line. On the packing tables the frozen giblets are added, and then the birds are trussed, weighed, graded and moved into a holding room, prior to entering blast freezers, before final packing and despatch.

An important secondary operation to that of the actual preparation of the chickens is the use of the waste materials. While the birds have been passing through the plant, the feathers and inedible offal have been transported to the by-products section. After excess water has been removed, they are cooked in a William Douglas pressure cooker. A series of power driven paddles inside the cooker serves to keep the material moving. Heating is provided by a steam jacket and a pressure of 75 p.s.i. is used. The finished meal is used in the production of broiler feed, and thus very little of the original chicken is wasted. The steam is produced at a pressure of 100 p.s.i. which is reduced to 80 p.s.i. for the rendering plant and 40 p.s.i. for the scalding plant.

AUTOMATIC FLOW CONTROL

Lindars Automation, Ltd., have developed a new and improved version of their range of electro-pneumatically operated slides for material flow control. The units are of fabricated mild steel construction, and are complete with air cylinder, solenoid operated air valve, open and closed position detection switch, and an air release valve for emergency hand operation and maintenance.

The design is claimed to preclude the possibility of jamming by the elimination of guides; the slide plate bears on rods when mounted beneath conveyor outlets, and on rollers when mounted at bin or mixer outlets. Easy fixing is ensured by its double flanged construction, say the makers.

Six standard sizes range from $4\frac{1}{2} \times 4\frac{1}{2}$ in. to 18 x 18 in. and they are available as single units or as part of complete control installations. Special sizes and fully dustproof versions are also available.

ELECTRIC PASSENGER CARRIER

The most recent addition to the industrial aids made by Wessex Industries (Poole), Ltd., is an electric industrial personnel carrier suitable for conveying V.I.P.'s, managers, breakdown and inspection staff, security men and other people who need to be conveyed rapidly to any part of a factory. The makers say that the Ford Motor Co., of Dagenham, are among the first users of this truck.

It is powered by an Exide *Ironclad* 24 v. 110 amp. hr. battery driving a C.A.V. electric traction motor which transmits the drive through a duplex chain reduction gear in totally enclosed housing. A pedal-operated 5 step controller is mounted in front of the driver, together with forward/reverse switch and resistance. The steel wheels have 16 x 4 pneumatic tyres and 6 in. Girling internal expanding foot brakes on the rear wheels, with hand parking lever. Steering is full-lock Ackerman type on the front axle, giving a turning circle of 16 ft. Range is approximately 18 miles and speed loaded on level surface is up to 15 m.p.h. Weight is 850 lb. (including battery); length is 6 ft. 3 in. and width 3 ft. 9 in. Two fabric covered foam rubber bench seats accommodate four people.

This electric personnel carrier is the latest addition to the range of equipment made by Wessex Industries (Poole), Ltd.

Advances in Food Technology

AEROSOLS

Microbiology

The increasing interest in pressurised foods stored at room temperature has made it necessary to focus attention on microbiological problems with respect to prevention of spoilage and assurance of wholesomeness.

Results obtained indicated that a significantly lower incidence of growth occurs when cans are gassed while the product is still hot, compared to cans gassed after the product has cooled to room temperature. Of particular importance is the fact that it appears possible for the product to become contaminated during gassing if organisms are present in the valve stem. No statistically significant difference in results was shown with the two types of valves employed. In view of the few cases in which mould from the product in the dispensing orifice penetrated into the can, further work on the effect of valve construction and use appears warranted.

Although growth of test organisms in some cans may be partly explained by high initial load and the resistant strains employed, results suggested that proper microbiological control in the form of good sanitation should be stressed.—E. Wheaton and P. W. Hardy, *Food Technol.*, 1959, **13** (10), 571.

ANTIBIOTICS

Preslaughter Effects

The objects of studies carried out in Poland have been to explore whether subcutaneous injection of antibiotics before slaughter preserves the meat of various animals and to compare the efficiency of the five most frequently used antibiotics, *viz.*, penicillin, streptomycin, chloramphenicol, tetracycline and terramycin. Other objects were to find out the optimum dosage and determine the necessary interval between injection and slaughter.

Terramycin and tetracycline in 5 mg./kg. doses proved to be the most potent and the most suitable interval after injection proved to be 3-5 hr.

Decay was best detected and its intensity determined by organoleptic methods. With regard to chemo-physical methods, Nesler's test and the test for hydrogen sulphide, both modified, proved to be the most suitable. Determinations of *p*H proved to be unreliable since even in cases of most advanced decay the values obtained were frequently low, between 5-9 and 6-3, which would not even suggest a suspicion of decay according to what are said to be the generally adopted rules. — M. Szulc, *Przemysl Spozywczy*, 1958 (10), 422.

EGGS

Paraffin Coating

Organoleptically determined changes in 65 paraffin coated eggs kept over 6 months at a temperature of 1·1°C. were compared with laboratory indices, thought to be the most suitable for evaluating the freshness of eggs, by measuring the air space, the *p*H of both the yolk and the white, the inorganic phosphorus content of the white and the degree of luminescence of the white in the light of a quartz lamp. The amount of non-protein nitrogen was also determined, assuming that this would obviate the more complicated determinations of ammonia and amino acids. Some eggs, which showed an advanced state of decomposition, were also examined microbiologically.

The height of the air space, the *p*H of the white and content of non-protein nitrogen and inorganic phosphorus proved to be good features in determining the freshness of the eggs, the latter two being the best. Determination of the non-protein nitrogen may, it appears, eliminate the need to determine the ammonia and amino acids content in egg white.

The advanced decomposition of some of the eggs was due to the action of large amounts of micro-organisms found in the egg white.—J. Sawicka, *Przemysl Spozywczy*, 1958 (9), 372.

MEAT PRODUCTS

Frozen Meat Dishes

As part of a research programme investigating the suitability for deep freezing of pre-cooked foods, the German Federal Research Institute for Domestic Science, Stuttgart, has carried out systematic experiments with different kinds of meat dishes.

The investigations showed that, in principle, meat dishes are well suited for deep freezing as the quality is not impaired by the freezing process. However, after prolonged storage at −18°C, the flavour is liable to be affected. This deterioration is rather more marked with fried "dry" dishes than with stewed or braised dishes frozen in gravy. The quality of beef after three months is slightly better than that of pork, veal or mutton where rancidity may be encountered. Freezing at −40°C was not found to have any clear advantage over freezing at −18°C so that the latter temperature must be regarded as adequate. With certain quickly prepared dishes such as beef or veal steak, frying is preferable to grilling, and the preparation time should be rather shorter than with freshly prepared meat. With underdone beefsteak it is advisable to adhere to a shorter maturing time prior to freezing, especially if the storage time is to exceed one month. Another decisive factor in preserving the quality of the meat is the application of suitable thawing methods.

Technical Press Review

February

World Crops.—Special number dealing with agricultural chemicals: Fertilisers in the Australian Wheat Industry; Liquid Nitrogen Fertilisers in the U.S.S.R.; Agricultural Chemicals from Oil.

Dairy Engineering. — Developments in Ice Cream Manufacture; Transport of Ice Cream; Ice Cream Equipment Review; Monitoring of Radioactive Contamination in Milk; Practical Cleaning Routines for the Dairy; How Hire Purchase can help the Dairyman.

Manufacturing Chemist.—Special Feature: Drying; The Polyols—2; Purity of Analytical Chemicals; Sulphosuccinates; Progress Reports: Hormones, Cosmetics and Toilet Preparations, Fertilisers and Plant Nutrients.

Paint Manufacture. — Advanced Paint Chemistry — 5: Polyester Resins; Rheology of Paint; Silicones improve Wax Polishes; Segregated Pilchard Oils.

Chemical and Process Engineering.—Special Feature: Filtration; Ceramics and Cermets in Nuclear Engineering; Swedish Heavy Water Process; Chemical Engineering Refresher Course No. 1.

Petroleum. — Drilling Fluids Review, Part 1; Bentonite in Drilling Muds; Some Thermodynamic Aspects of Converting Heat into Work; Oil Survey in English Channel; Corrosion Problems of the Petroleum Industry; X-Ray Testing in Pipeline Welding; Effect of CMC Viscosity in Drilling Mud Properties.

For specimen copies write to Leonard Hill House, Eden Street, London, N.W.1.

Dishes frozen in gravy should be heated with the addition of a little water; " dry " dishes should be thawed in the oven at a temperature of 200°C. —R. Zacharias, *Kältetechnik*, 1959, 11, 394.

Bacteriological Tests

In order to determine an optimum standard method for bacteriological testing in meat processing plants, investigations have been carried out by the Institute for Bacteriology and Histology at the Federal German Institute for Meat Research, Kulmbach. With swabbing, best results are obtained if the swabs are moistened with a salt solution to which 0·1% tryptically digested peptone had been added; such swabs can be used for four days. After sampling, the swabs are shaken with glass beads in a salt-peptone solution before spreading on an agar medium. To obtain data concerning the numbers of samples required for reliable inspection, systematic tests were carried out in four meat processing plants over periods extending over ten or eleven successive days. It was found that, in order to eliminate the effects of unavoidable daily fluctuations in bacteriological conditions, samples must be taken on, at least, three successive days, at the end of the working day. The tests also served to establish certain limit values for bacterial counts in samples taken from different parts of the plant. In this way, it has been possible to obtain data for a standard procedure to be adopted for the bacteriological testing of meat processing plants.—F. Kelch and H. Friess, *Die Fleischwirtschaft*, 1959, 11, 1,011.

NUTRITION

Turkey Poult Rations

The growth promoting properties of condensed herring solubles for poultry are said to have been repeatedly demonstrated, but turkey poults, because of their rapid rate of growth, have high and critical nutritional requirements. Accordingly, experiments have been conducted to find out if condensed herring supplements might not be as suitable as brewers' yeast as a natural supplement of B-complex vitamins in their diet.

From the tests it was concluded that, with the type of practical turkey starting diet used, the herring solubles was an effective supplement. Poults from three different sources showed a better response to condensed herring solubles than to dried brewers' yeast. The difference between the response to condensed herring solubles and to dried brewers' yeast occurred with a diet containing herring meal and with diets containing no herring meal but supplemented with vitamin B_{12}.—B. E. March, J. Biely, H. L. A. Tarr and R. A. MacLeod, *Progress Reports of Pac. Coast Stations*, 1959 (113), 3.

STARCH

Syrup Purifying

Mineral compounds and coloured organic substances were removed from starch juices with " native " ion exchangers and activated carbon. Converter juice, with *p*H 2.3, and an ash content of 0·25 per 100° Brix, was passed through a battery of four columns. Two of the columns were in regeneration.

Within 2 hr. the juice obtained became slightly turbid. It was heated to 45°C. with 0·5% by weight of activated carbon, vacuum filtered through Schott's funnel and concentrated under vacuum to 83° Brix.

The analysis of the resulting syrup was as follows: ash—0·007% per 100° Brix; and acidity—2·0 ml. of 1 N sodium hydroxide per 100 g. syrup. No trace of turbidity was noted during more than 2 years' storage and the syrup was colourless. Demineralisation without activated carbon was less effective.—S. Zagrodski and Z. Niedzielski, *Przemysl Spozywczy*, 1958 (10), 405.

Correspondence

Chicken Flavour

SIR,

In your October issue on page 374 you called attention to an article in the *Daily Telegraph* which criticised the flavour of intensively reared chickens.

I felt, therefore, that you would be interested in the results of a chicken tasting test recently carried out by the Chicken Information Council, and I enclose a report on this.

BOB RIDING,
Executive,
Chicken Information Council,
Fitzherbert House,
49, Park Lane, London, W.1.

The report states: The Chicken Information Council claims that chickens reared indoors on a large-scale have just as much flavour as chickens reared outdoors by the old method.

The Council recently challenged an independent panel to sample chicken reared by both methods and distinguish between the two. The tasting session was held before a large audience in a Harrogate Hotel.

The panel after sampling 52 plates of chicken declared that it could detect no difference in the flavour, and that it was unable to distinguish between the two types of chicken.

On the panel were three famous women journalists, a well-known cookery writer, two home service advisers, and a Harrogate husband and wife. They sampled six chickens reared indoors, and six reared outdoors.

Mr. Tony Pendry, Chairman of the Chicken Information Council, said that exhaustive tests in the U.S.A. had also proved that chicken reared indoors had just as much flavour as any other chicken of similar age.

Mr. Pendry emphasised that the flavour of chicken was delicate, and could soon be lost by overcooking.

" Today's chicken are so much more tender than ever before, and I am afraid that some housewives remembering the toughness of pre-war birds still tend to overcook their chicken," he said.

A bacon industry board ?

SIR,

A crisis is looming up within the British bacon industry. Lack of continuity and periodic lapses of quality in the standard of home-produced bacon, the sale of cheaper imported and sometimes inferior quality bacon, has permitted Danish bacon to take the lead.

Continuity and quality are absolute prerequisites for a trade which has to retail its products to the consumer at high prices. Price cutting, considered desirable by the multiple and retail trades, has its disadvantages to the industry as a whole as it only too often results in poorer quality, which in turn discourages the consumer from buying.

The answer could well be, after due consultation with the various trade bodies, the setting up of a statutory board to assist the pig producer, encourage better standards and quality control within the bacon factories, assist in the disposal of surpluses within the trade (but not as a marketing board) and to institute training schemes and a suitable programme of advertising and sales promotion. In short, the establishment of a Bacon Industry Board with sufficient power to its arm to lift the bacon industry out of the rut. This has been done successfully in other industries.

(name and address supplied.)

News Digest

Birds Eye Open New Cold Store at Kirkby

A 4,000 ton cold store was officially opened at the Birds Eye Foods Factory, Kirkby Trading Estate, near Liverpool, on December 9. This cold store is in addition to existing stores totalling 1,500 tons. The new building was made necessary as a result of the enormous growth of the quick-freezing industry.

The Kirkby factory is unique within the Birds Eye organisation in having a woman as factory general manager. Miss Louisa G. Gibb has occupied this post for the past three years, after a lifetime spent in the food industry.

This new building has refrigeration equipment to provide a normal temperature of −5°F., but is capable of maintaining a temperature of −20°F.

A railway siding runs alongside the cold store for easy loading direct into refrigerated rail containers. The siding stretches for 425 ft. straight along the new loading bank, except for a section of 125 ft. at one end which has been developed for loading road vehicles.

The new cold store was completed in six months from the date when work on the foundations started.

Guests who attended the cold store opening were taken on a short tour of the factory after which they were addressed by the chairman of Birds Eye Foods, Mr. J. R. Parratt.

Mr. Parratt said that the sales of quick-frozen foods had increased 250 times since shortly after the war, 1959 would have seen the greatest expansion ever in this business. More than 64,000 retailers now stock Birds Eye products, and nearly a quarter of these only became stockists during 1959. At the Kirkby factory, which is one of five operated by the company, there are 1,200 people working. In Kirkby's first year in 1952, just over 6 million packets were produced. In 1959, the number would be almost 50 million.

Fluorine in Food Regulations, 1959

On March 14, 1960, new regulations relating to the flourine content of acidic phosphates used for food purposes and of food containing acidic phosphates, based on the recommendations of the Food Standards Committee, will come into operation in England and Wales. The regulations revoke the Flourine in Food Order, 1947, and prescribe lower maximum limits than those laid down in the 1947 Order for the flourine content of acidic phosphates and related foods.

The Secretary of State for Scotland proposes to make corresponding regulations which will apply in Scotland and similar regulations for Northern Ireland are under consideration.

Third factory trawler launched

The single screw, stern operating, fish factory trawler *Fairtry III*, sister ship of *Fairtry II* launched earlier this year, was launched on December 17 at the yard of Wm. Simons and Co., Ltd., Renfrew. Both vessels have been constructed for the whaling firm of Chr. Salvesen and Co., Leith.

The vessel will fish by the stern trawling method and will operate on the northern distant water fishing grounds, particularly west Greenland and Newfoundland. The vessel's endurance and her storing and victualling arrangements are designed to enable voyages of over three months to be carried out, making possible very long periods on the fishing grounds and thus providing the best chance of the vessel obtaining good catches.

The dimensions of the new vessel are: length, 235 ft.; breadth, 48 ft.; and depth, 25 ft.

She will be powered by diesel electric machinery, the three main generators providing current for the propulsion motors of 2,000 s.h.p. at 130 r.p.m.

She is fitted with the latest fish filleting and processing machines and these incorporate improvements and additions on the *Fairtry II* installation. Freezing equipment will handle 30 tons of cod fillets in 24 hours. The catch is completely processed without waste; a valuable by-product is the extraction of oil from livers and all offal is converted to fish meal.

New batch house for United Glass

A modern batch house, costing over £70,000, for mixing and supplying raw materials for the manufacture of thousands of glass bottles a day, has been opened at the Castleford works of John Lumb and Co., a division of United Glass Limited. The 75 ft. high building with a 105 ft. high elevator is capable of mixing 40 tons of raw materials an hour, and, working one shift, replaces three old batch houses working two shifts.

United Glass in its factories in England and Scotland employs over 10,000 workers, and although present at the opening ceremony were the Chairman, Mr. Leonard Elgood, O.B.E.(MIL.), M.C., D.L., J.P., C.A., and other members of the Board, the honour of officially opening the new batch house was given to the youngest apprentice at the Castleford works, 17-year-old Keith Shaw.

Tunnel Glucose cocktail party

A cocktail party to celebrate the 25th anniversary of Tunnel Glucose Refineries, Ltd., was held at the House of Commons on December 18. Brief speeches were made by Mr. Maudling, President of the Board of Trade, and Mr. L. S. Wigdor, the Managing Director.

The company's first refinery was established at Greenwich in 1934. By 1939 the company was the third largest glucose manufacturer in the U.K. Since 1953 new plants, laboratories and a power station have been built, and further developments are planned for the next five years.

Eastbourne trading estate

The Eastbourne Corporation have established a trading estate at Brampton Road, Eastbourne. Three factories have been erected on the estate, and a further one is in course of erection. Suitable sites are stated to be available for other factories. In addition, there are other industrial sites in the town which are owned by the Trustees of the Chatsworth Settlement and available for development.

The Corporation have produced a booklet entitled *The Industrialist's life in Eastbourne*, which is designed to draw attention to the opportunities for industrial development in the town.

Conversazione at the Royal Society

The Food Section of the Parliamentary and Scientific Committee held a conversazione in the library of the Royal Society, Burlington House, London, W.1, on December 9. The Parliamentary and Scientific Committee is a group of senior scientists and representatives of both houses of Parliament, whose president is Lord Morrison of Lambeth. The present acting chairman is Dr. R. F. B. Bennett, V.R.D., M.P.

This was the first conversazione at which there have been any exhibits, of which there were 20, the theme being "Science in everyday life." The exhibit on Animal Health and Food had the place of honour, being exhibit No. 1; this exhibit was produced under the auspices of B.F.M.I.R.A., the British Veterinary Association, the Cereals Research Station of the Research Association of British Flour Millers, the Ministry of Agriculture, Fisheries and Food, and the Royal College of Veterinary Surgeons.

Among the items of equipment belonging to the B.F.M.I.R.A. which were on view were the FIRA/NIRD extruder, the salinity tester which permits rapid testing of the salt distribution in cured meat, and the Warburg respirometer which measures oxygen uptake by meat. Also on view were visual descriptions of food preservation both traditional and modern, covering pickling, drying, smoking, canning, refrigeration, deep-freezing and dehydration, as well as B.F.M.I.R.A.'s collection of ancient and modern foods, including an 1823 tin of roast veal, and the Bronze Age foods described in our December, 1959, issue.

Left to right: Tunnel's managing director Mr. L. S. Wigdor and chairman Mr. L. A. Hart, with Mr. Julian Salmon of J. Lyons and Co., at the House of Commons party to celebrate the 25th anniversary of the company.

New M.B. factory at Arbroath

A factory for the manufacture of can containers for processed foods is to be built at Arbroath by the Metal Box Co., Ltd. Work on the factory is expected to begin in the spring, and it will be situated on the Elliot industrial site.

The new plant, which will begin with the production of several million cans a week, will reduce appreciably the transport charges to Scottish customers as far north as Peterhead, whose needs are met at present by the company's factory at Carlisle.

The new works will employ about 100 people.

Erections and Extensions

H. J. Heinz, Ltd., are having a distribution depot built on a site at Whitton White House, Ipswich, Suffolk.

*

Metal Closures, Ltd., are extending their warehouse and storage premises in Bromfors Lane, West Bromwich, Staffs.

*

J. Sainsbury, Ltd., are having a poultry processing and packing factory erected at Mildenhall Road, Bury St. Edmunds, Suffolk.

*

W. Phillips and Co. (Preserves), Ltd., are having an extension built to their factory at Gurney Road, Stratford, London, E.15.

*

Moorhouse Brothers, Ltd., mineral water manufacturers, are having a factory built on a site at George Street, Birkenhead, Cheshire.

Fruscose, Ltd., are planning to convert premises into a mineral water factory at the junction of Westbourne Road and Rosedale Street, Sunderland.

*

G. Barraclough (Soft Drinks), Ltd., are having a mineral water factory built on a site at Cutler Heights Lane, Bradford, Yorks.

*

Biddle and Gingell, Ltd., mineral water manufacturers, are having a factory built at Lea Bridge Road, London, E.10, at an approximate cost of £50,000.

*

Schweppes, Ltd., mineral water manufacturers, have plans in hand for the erection of additional premises for essence production plant at their factory in Edgware Road, West Hendon, London, N.W.9.

News for Importers

Drawback of import duty.—The Board of Trade are considering an application for the allowance of drawback of duty on the following goods imported for use in the manufacture of the export goods described:

Imported goods: Dried white beans other than butter beans.

Export goods: Canned beans in tomato sauce, with or without sausages, pork or bacon. Canned beans in curry sauce. Canned beans in gravy.

Imported goods: Fresh bitter oranges.

Export goods: Orange marmalade and oranges prepared for use in the manufacture of marmalade.

Import of sugar in 1960

Arrangements for the import of sugar in 1960 will be based on the International Sugar Agreement of 1958 and follow the sames lines as those for 1959 (Notice to Importers No. 895 dated February 6, 1959).

Imports of sugar, including invert sugar, molasses, syrups and other forms of liquid sugar not admissible under the Open General Licence, will, as before, be admitted without limitation of quantity under Open Individual Licences when originating in any country which is a party to the International Sugar Agreement. The countries participating in the Agreement, in addition to the United Kingdom and many United Kingdom dependencies, including the British West Indies, British Guiana, British Honduras, Fiji and Mauritius, are: Australia, Belgium, Brazil, Canada, China (Taiwan), Costa Rica, Cuba, Czechoslovakia, Denmark, Dominican Republic, El Salvadore, France (including Algeria, Martinique, Guadaloupe, French Guiana, Réunion Island), Federal Republic of Germany, Ghana, Greece, Guatemala, Haiti, Hungary, Indonesia, Republic of Ireland, Italy, Japan, Mexico, Morocco, Netherlands, Nicaragua, Panama, Peru, Philippines, Poland, Portugal, Union of South Africa, Union of Soviet Socialist Republics, United States of America.

Traders who hold Open Individual Licences under the earlier arrangements are being advised of the extension of the validity date of their licences to the end of 1960. Other traders may make application on form ILB/A which should be sent to the import Licensing Branch, Board of Trade, 43, Marsham Street, London, S.W.1.

Licences will be issued against a fixed quota for the import of sugar, including invert sugar, molasses, syrups and other forms of liquid sugar not admissible under the Open General Licence, originating in countries and territories which are not parties to the International Sugar Agreement. Applications for licences under this quota are invited from traders who held licences under the corresponding quota in 1959. (It should be noted that certain countries from which imports were formerly limited under the quota are now participating countries.) It may also be possible to issue licences to traders who did not hold licences in 1959. Applications for licences under the quota should be made on form ILB/A. Licences will be valid until December 31, 1960, and will not be extended.

Reed Corrugated Cases, Ltd.

From January 1, 1960, the newly formed Produce Packaging Department of Reed Corrugated Cases, Ltd., will be responsible for the marketing of the horticultural products of R. H. Filmer, Ltd., and Reed Corrugated Cases, Ltd. The firm say that the appointment of a larger number of accredited stockists, together with specialist representatives, will ensure that not only will there be a full range of such products available in all the main growing areas, but that growers all over the country will benefit from a more personal service.

What is claimed to be the largest single consignment of soup ever to be carried by British Railways left the Kings Lynn, Norfolk, factory of Campbell's Soups, Ltd., on December 28, 29 and 30 in four separate trains each carrying one of the four new kinds of soup recently introduced. The soups were carried to centres for distribution to shops all over the country. The four kinds of soup, shown below, are: Old-fashioned Tomato Rice (new not only here but also across the Atlantic, where, say Campbell's, it has broken all records since its introduction in the autumn), Ox Tail, Cream of Celery, and Chicken Noodle. The picture above shows one of the trains, hauled by a diesel-electric locomotive, leaving the factory siding.

Canning anniversary celebrations

A committee to organise the celebrations to mark the 150th anniversary of the granting in 1810 of a British patent to Peter Durand "for the preservation of food in tinned iron canisters," has been formed under the chairmanship of Mr. W. R. Lewis, assistant director of the Tin Research Institute. Represented on the committee are: British Food Manufacturing Industries Research Association; British Tin Box Manufacturers' Federation; Food Manufacturers' Federation Inc.; Fruit and Vegetable Canners Association of Great Britain; Fruit and Vegetable Canning and Quick Freezing Research Association; Tinplate Conference (1925); Tin Research Institute; and the Worshipful Company of Tinplate Workers alias Wire Workers.

The committee's offices are at 8/10, Spenser Street, London, S.W.1. (Tate Gallery 2316/7) and the secretary and information officer is Mr. S. C. W. Picton.

The celebrations will include a number of exhibitions, concluding with a banquet at Guildhall in the autumn.

PEOPLE

MR. A. I. BAKER, C.B.E., J.P., M.A., M.I.MECH.E., M.I.PROD.E., whose appointment as President of the British Engineers' Association has been announced, is chairman of the Baker Perkins group of companies.

A great-grandson of the founder of Joseph Baker and Sons, Ltd., a company which merged with Perkins Engineers in 1919, he joined the organisation in 1931 after graduating in engineering at King's College, Cambridge, and studying at the Harvard School of Business, U.S.A. He worked in various departments of the company at its Peterborough headquarters and spent some time in the U.S.A. and Germany before being appointed to the board in 1936. In 1944 he became Chairman, following in direct succession his father and grandfather.

In addition to his activities on most of the boards of the fifteen member companies within the group, Mr. Baker is a Justice of the Peace, President of the Bakery Equipment Manufacturers' Society, a member of the Engineering Advisory Council of the Board of Trade and a member of the Eastern Counties Committee of Lloyds Bank, Ltd. He will hold office as President of the Association until October, 1961.

*

MR. B. A. WORSWICK, B.SC.(HONS)., A.INST.P., has been appointed to the post of technical director of Elcontrol, Ltd., with a seat on the board. He was until recently chief engineer of Fischer and Porter, Ltd., and previously was chief development engineer of Bailey Meters and Controls, Ltd., after having served for some years with I.C.I., Ltd.

*

MR. W. H. RITCHIE has been appointed development manager-projects, and MR. N. G. H. THOMAS development manager-products, of Monsanto Chemicals, Ltd., both appointments taking effect from January 1, 1960. Mr. Ritchie, who joined Monsanto in 1937, will be responsible for progressing the manufacture of new products, and for development planning. Mr. Thomas, who joined in 1946, will be responsible for the development and introductory marketing of new products, and for market research.

*

MR. P. G. HUNT has now joined PIDA as Public Relations Officer. For the past four years he has been an information officer with the Scottish Information Office, Edinburgh. Prior to that he was a P.R.O. with the National Savings Movement. In the last Birthday Honours List Mr. Hunt was awarded the M.B.E. for public relations work in Scotland.

Mr. A. I. Baker

Mr. F. G. White

Mr. R. M. Colledge

MR. FREDK. G. WHITE has been appointed Sales Director of the Oppenheimer Casing Co. (U.K.), Ltd., and MR. RAY M. COLLEDGE has been promoted to Sales Manager. Both have worked closely together for some years.

*

T. Wall and Sons (Ice Cream), Ltd., announce the appointment, effective from November 30, of MR. M. J. HASLETT as site manager of The Friary, Wall's factory at Acton. Mr. Haslett had previousy served as Technical Director with Joseph Watson and Sons, Ltd., a Unilever subsidiary. In promotion to his new post with Wall's, Mr. Haslett will be in charge of all aspects of production at the London ice cream factory.

*

A new appointment, that of group marketing manager, is announced by two associated companies, Viscose Development Co., Ltd., and Sponcel, Ltd. MR. A. GILLAM, who has now taken over this appointment, has previously been with Batchelors Foods, Ltd., Reckitt and Coleman, Ltd., and Spratts Patent, Ltd., and has gained a wide experience of marketing. In his new position, he will be responsible for expanding sales of the companies' products, cellulose closures and sponges, both in the U.K. and in the export market.

SIR WILLIAM C. FENTON, M.C., J.P., who has been Managing Director of British Belting and Asbestos, Ltd., Cleckheaton, since 1935 and also its chairman since 1954, has relinquished the former office. MR. F. PEARSON, at present director and controller of the company, has become managing director.

*

MR. F. H. P. TRIP has been appointed as a vice-president of International Flavors and Fragrances Inc. Mr. Trip was deputy managing director of the European area management of International Flavors and Fragrances, Inc.

*

Death of Editor of "Chemistry and Industry"

It is with great regret that we report the death on Tuesday, January 12, of MR. WILLIAM ERNEST DICK, B.SC., F.L.S., editor of *Chemistry and Industry*, the weekly publication of the Society of Chemical Industry. He was 45. Bill Dick, as he was widely known, was an outstanding technical journalist, his most notable achievement being his editorship of *Discovery*, which journal he served for 12 years. He was an author as well as an editor, his most recent book being "Atomic Energy in Agriculture". His death represents a tragic loss to technical journalism and we offer our sincere sympathy to his widow, Esther Dick.

Company Profits & Prospects

Procea raise profits

Procea Products, Ltd., raised their net profit before tax for the year ended August 31, 1959, to £96,344 (£55,668). A final dividend for the year (subject to audit) of 8%, making a total of 12½%, will be paid. The dividend last year was 10%.

Remploy, Ltd.

A company with a difference is Remploy, Ltd., which was set up in 1945 to provide work for disabled men and women. Its 90 factories in England, Scotland, and Wales, employ some 6,250 severely disabled people, who manufacture a wide variety of products.

At the recent a.g.m., the chairman, Sir Alec Zealley, said that although sales increased during the year by 11% to the record figure of £4·2 million, operating loss increased by £90,000 to £2·8 million. His aim was to reduce the operating loss by increasing sales so as to keep steady the Ministry of Labour grant. If the loss were reduced, more disabled people could be given work.

A loss was inevitable, because the firm's products are strictly competitive in price and quality with those of other firms, and prices are based on the normal output of fit people, whereas the average output of a Remploy employee is only one-third that of a fit person.

New premises opened by Foodtech, Ltd.

"One-third lean beef, one-third lean veal and one-third fat pork," said Mr. Helmut Hilgeland, "is the ideal composition of Frankfurter sausages," and as he was speaking, his son Peter was suiting action to his father's words and feeding these ingredients into a Foodtech Ems-Rotor *Turbomat*, while an invited party, gathered to mark the opening of Foodtech's new offices and showrooms at 581, Green Lanes, London, N.8, looked on. The cutter blades of this machine rotate at 4,400 r.p.m., and appeared to deal with the solid blocks of ice which followed the meat as easily as they dealt with the meat itself.

The new premises have been acquired to provide the firm with additional and more conveniently sited accommodation. Two adjoining main road properties, Nos. 581a and 581b Green Lanes, have been turned into one, and now form a showroom and

fully-equipped demonstration room with machine stores, despatch department and workshop, all on the ground floor. Above are offices for administrative staff, spare parts stores and stores office.

A modern style shop front with maximum window area has been installed as a frontage for the showroom, complemented by fully opening and folding doors for the machinery and despatch section which enable the largest machines to be delivered direct into the receiving stores.

The firm hope that the new premises' closeness to the main London railway stations will greatly speed up deliveries. The company's premises at Bush Hill Park are being retained as a warehouse for general merchandise.

Scottish food exhibition

The Scottish Food Exhibition will be held again in the Kelvin Hall, Glasgow, in 1960, from April 19 to 30, and will be the third show of its type sponsored by the Scottish food and wine organisations. As at previous shows, the Governments of Australia, New Zealand, Ceylon, Denmark, and the Netherlands will stage large presentations of their food industries.

Cheese Council index

The English Country Cheese Council is compiling an index of all those who are in any way interested in English country cheeses, whether they be manufacturers, factors, wholesalers, retailers of all kinds, hotels, restaurants and public houses.

It would be of great assistance to them if any reader concerned with English country cheeses for any reason whatsoever, would write to Stephen Darlot, Quality House, Quality Court, Chancery Lane, London, W.C.2, giving all relevant details of their particular activities.

Where are Durand's relatives?

British canning organisations celebrating the 150th anniversary of canned foods in 1960 are seeking the descendants of London-born Peter Durand, the man who patented the first tin can. In 1810 Durand took out Patent No. 3372, covering the use of "tinned metal canisters" for containing preserved food. Within a year the world's first canned foods were being produced by Bryan Donkin, F.R.S., in a Bermondsey factory. From Durand's patent sprang the vast world canning industry which today produces an estimated 50,000 million cans a year. But Durand himself faded from history. It is known that he lived in Hoxton. "And that," said an official of the Committee organising the celebrations, "is about all we do know. But if Peter Durand had any descendants we feel that they should be invited to take part in our celebrations."

The Committee, which represents British tinplate, can-making and canning industries, is planning big-scale 150th anniversary celebrations as part of an international "canned foods year." The Lord Mayor of London, Sir Edmund Stockdale, is to attend a commemorative dinner at Guildhall, and there will be a number of canned food exhibitions throughout the country.

Agriculture symposium

A symposium entitled "Analytical Chemistry in the Service of Agriculture" will be held at Nottingham University on Thursday and Friday, July 14 and 15, 1960, at which papers will be presented on topics which will include: determination of pesticide residues; determination of metals in soils and plants; analytical aspects of dairy-farming; the protection of the consumer against harmful effects of pesticide residues; and determination of additives in feedingstuffs.

The programme will also include a visit to a horticultural or agricultural research station in the district. The fee for the symposium will be £3 3s. An informal dinner at a cost of about £1 1s. will be held on July 14, and hostel accommodation will be available at Nottingham University. Registration forms will be ready shortly, and may be obtained, together with further information, from C. A. Johnson, Standards Department, Boots Pure Drug Co., Ltd., Station Street, Nottingham.

All books reviewed in FOOD MANUFACTURE as well as any other scientific or technical book may be obtained from:
Technical Books
308, Euston Road
London, N.W.1.
Tel: Euston 5911.
Prompt attention is given to all orders.

FORTHCOMING MEETINGS

Royal Society of Health, 90, Buckingham Palace Road, London, S.W.1:—February 10, 2.30 p.m., "Nutrition and Cardiovascular Disease" by Dr. H. M. Sinclair, reader in human nutrition, Oxford; March 16, 2.30 p.m., "New Foods for World Needs," by Dr. N. W. Pirie, F.R.S.

The society's annual congress will be held from April 25-29, at Torquay.

Institute of Plant Engineers, Imperial Hotel, Temple Street, Birmingham:—February 18, 7.30 p.m., "Food Processing, a general talk" by L. A. Hand.

S.C.I. Food Group, 14, Belgrave Sq., London, S.W.1:—February 10, 6.15 p.m., Nutrition Panel Meeting; February 24, 6.15 p.m., "New Methods of Factory Hygiene," "Chemical Sterilants," "Hygienic Consideration in Plant Design."

North British Hotel, Princes Street, Edinburgh:—February 18, 7.30 p.m., "The Concept of Food Science" by Prof. J. Hawthorn.

Food News Overseas

World Nutrition Congress to be held in Washington

The Fifth International Congress on Nutrition will be held in Washington during September 1-7, 1960. The International Union of Nutritional Sciences was organised at the first meeting of the Congress in London in 1946. In the intervening years, congresses have been held in Switzerland, Holland, and France.

Participants grew to 360 registrants from 32 countries at the Third International Congress in Amsterdam in 1954. Attendance reached 900 at the Fourth in Paris in 1957, and is expected to total over 2,500 at the Fifth in Washington.

The scientific programme will be presented in seven half-day sessions. Several sections will run concurrently, three of which will have simultaneous translations. One section during each of the seven sessions will feature a 3-hr. panel discussion by invited participants. Among the topics for the panels will be: evaluation of nutritional status in man; effects of processing and additives on nutritive value; animal nutrition and food production; proteins and amino-acids in nutrition; and new possibilities in nutrition research.

Concurrently with the panel discussions special programmes will be devoted to, among others, aspects of preservation, metabolism, physiology and vitamins, and an all-day session on food needs and resources presented by invited authorities will include discussions of world population and food problems, public health and socio-economic factors.

The Secretariat's address is: 9650, Wisconsin Avenue, Washington 14, D.C., U.S.A.

Interpack, 1960

The international packaging exhibition known as Interpak 1960 is to be held in Dusseldorf from April 20-27, 1960, inclusive. The exhibition is substantially larger than that staged in 1958 and will fill 6 adjoining halls covering some 800,000 sq. ft. It will also include a display of machinery and equipment.

N.Z. mushroom growers use natural heat

The thermal resources of Rotorua, in the central plateau of the North Island of New Zealand, have been successfully tapped to provide heat for commercial mushroom growing. The two young Rotorua men who have achieved this difficult task are Messrs. R. F. Bellerby and E. E. Williams.

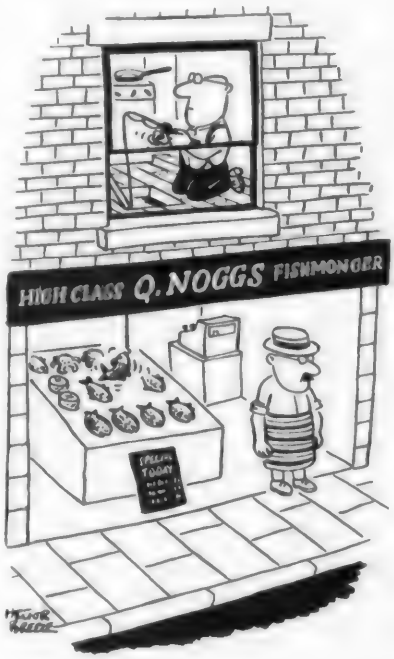
In the last few months they have erected buildings, connected pipelines and grown their first mushroom crop.

The only work they did not do themselves was to drill the 170 foot bore at the back of their property at Whakarewarewa. The 4-in. bore gives a steady pressure of 20 lb. and the Puarenga stream below makes the disposal of waste water no problem.

Two adjoining growing-rooms have been built and two more are under way. By rotation of crops an almost constant output can be obtained.

The mushrooms are grown in trays stacked in 7 ft. high tiers. Each contains a composted mixture.

The mushroom spawn is sprinkled over the top after the room and its contents have been sterilised by releasing live steam at a temperature of 140°F. The impurities in thermal steam make it unsuitable and so a heat exchanger is used to heat and obtain steam from town supply water.



The two men consider that in the future bore heat will be more economical than the oil-burners used by most growers. They say the only real expense in this part of the work lay in the original drilling and pipe installation. From now on natural heat should save them trouble and money.

Banana processing in Dominican Republic

The $1 million extensions to the banana purée plant of the Granada Company, Dominican Republic, have been opened at Puerto Libertador. The new capacity of the plant is 30 million lb. of purée annually.

To supply the plant an additional 6,000 acres have been planted with disease-resistant banana stock. Concurrently a plan for producing tomato purée for export to soup manufacturers and other large-scale users is under way.

The company reports that since 1957 when new plantations and large-scale irrigation schemes were commenced, exports of bananas have risen from 1 million stems in 1957 to 3 million in 1959. The estimate for 1950 is 5 million stems.

Food enrichment in South Africa

Although a survey recently carried out by the National Nutrition Research Institute of South Africa into the possibility of reducing widespread protein defficiency by enriching bread with fish flour shows that nutritive value could be increased economically, this enrichment is not recommended.

Protein malnutrition is widespread only among Bantu children between the ages of six months and five years. Sales of bread are confined largely to the cities and country towns, and the scheme would not reach that section of the population most in need of the extra protein. A large proportion of the enriched bread would be consumed by people whose diet was already adequate.

Large quantities of fish are landed from ports remote from marketing centres, and from these could be prepared commercially a protein-rich flour which could be used to enrich bread up to 4% without appreciably altering the taste, appearance or physical characteristics of the loaf. The report recommends further study into the possibility of getting this valuable food to the non-European population living in rural areas.

OBITA DICTA

● Hot dogs in the United States, linked with soft drinks, form a large part of the teenage diet.—*Press Release.*

● A new brewery recently began operations in Panama. It is the "Cerveceria del Baru" and the product has been very well received.—*Export Services Branch Report.*

● The largest dose of alcohol given was approximately equivalent to three pints of average beer or five fluid ounces of wisky taken by a man weighing 11 stone.—*Report in Daily Telegraph.*

● Their invention consists of as many different kinds of ice cream as can be scooped on to one dish, with a different sauce over each and the whole topped with whipped cream, cherries and nuts.—*Press Release.*

● Don't you ever watch I.T.V. and see some of the shocking advertisements which are slung across the dining room every time that someone sits down to an evening meal.—*Mr. Mason, M.P. for Barnsley.*

● When first approached to pose, Monsieur Albin (Savoy Grill Room Chef) was hesitant. Take my picture with an *English* breakfast? Pouf! It is like asking me to play the violin in the cabaret.—*Sunday Times.*

● When you get as far away as, say, Malaya, the (Guinness) myth takes on heroic proportions; for it is reliably reported that "among the Chinese in Malaya, particularly the Cantonese, it is customary to bath a newborn baby in Guinness."—*The Times Guinness Advertisement.*

● It is very odd, and a curious feature of our times, that uncomplimentary remarks can be made with impunity in your correspondence columns about the Primate of all England, whereas a howl of protest is immediately raised when someone dares to utter unkind words about Stilton cheese.—*Letter in Daily Telegraph.*

● Lipstick that has turned has the same effect on the one who kisses them as roast crow larded with furniture polish but labelled as "carnard à l'orange" would have on an unsuspecting palate. It is the kind of thing that makes a man beat a hasty retreat . . . either from the girl whose lipstick is rancid or from the disgusting morsel as the case may be.—*Naarden News.*

Overseas Enquiries

Malta: Confectionery, biscuits, etc.

John Gambin and Co., P.O. Box 506, 9, Angel Street, Zebbug, Malta, would like to import on their own behalf or undertake the representation of British manufacturers of all confectionery lines such as toffees, drops, biscuits, chocolate in bars, chocolate liqueurs, chocolate wafers, biscuits, etc.

Mr. John Gambin is the sole owner of John Gambin and Co., and he is considered to be a suitable connection for U.K. firms.

Interested manufacturers should write direct to John Gambin and Co. At the same time, they should notify the Department of Trade and Industry, 9, Merchants' Street, Valletta, Malta, that they have done so.

Mexico: Fish meal processing plant

Mr. Stephen Szekely, Apartado Postal 7853, Mexico D.F., has informed the British Embassy at Mexico City that he has received an enquiry for a complete plant for processing fish to produce between 50 and 100 tons of fish meal per day, and would like to get in touch with U.K. firms who can supply the complete plant, which would include refrigerating unit, cleaning unit, and filleting unit, etc.

Mr. Szekely, who is an independent commission agent and manufacturers' representative, represents a number of U.K. manufacturers in Mexico, and is considered to be a suitable connection for U.K. firms.

Manufacturers interested in this enquiry should write direct to Mr. Stephen Szekely quoting the rate of commission they give, their prices in U.S. dollars and the measurements of the plant in the metric system. It would be appreciated if, at the same time, they would notify the Commercial Department, British Embassy, Lerma 71, Colonia Cuauhtemoc, Mexico 5 D.F., P.O. Box 96 Bis, that they have done so.

Chile: Fish meal and canning plant

The Universidad Catolica of Valparaiso, Chile, would like to get in touch with U.K. manufacturers of fish meal and canning plant. They wish to obtain a fish meal plant of daily capacity up to 25 tons of raw material, fat or otherwise, with oil separator, glue water concentrator and deodorizing system. The offer should be accompanied by a list of machinery belonging to the plant; installation plans; power of the different motors; number of operators needed to operate the plant; oil consumption per 100 kg. of meal produced. The plant should include all the installations, including interior conveyors, fish lifts from the storage well and conveyor within the well of 0.30 cm. diameter and 6 m. length.

A canning plant is also required of approximate daily productive capacity of up to 50 boxes of 48 tins of ½ lb. each. Equipment should consist of direct-steam cooker; water pressure cooled sterilizer; semi-automatic sealer for all types of tin containers; kettle for 200 l. with steam casing made of stainless steel; automatic oil and salt dispensers; and lid marker.

Consideration must be given to the fact that a Vapor (U.S.A.) steam generator of 1,200 kg. of steam per hour at 8 atm. has been acquired, which will be used for the plants.

The British Embassy mention that the sale of British equipment to the University is of prime importance because students trained on it will obviously be oriented towards Britain as a source of supply for similar equipment.

Spain: Banana cleaning machinery

Sr. Victor Manuel Canduela Liguette, Rampa de Sotileza, 8, Santander, wish to get in touch with U.K. manufacturers of machinery for the cleaning and packing of bananas for export.

The operational phases are as follows: cleaning with jets of water under pressure (this is only for those bunches affected by Cochinilla, *i.e.*, about 10% of the bunches); cutting away defective fruit; weighing and marking bunches; filling in gaps of bunches, with paper, packing to avoid damage to fruit by friction; padding bunches with kraft paper and straw and securing them with sisal; and loading individual bunches on to lorries.

The first five phases would be best carried out with the bunches suspended, and the loading could be effected by means of conveyors. One of the main difficulties to overcome is said to be the wrapping of bunches of bananas whilst they are hanging, without taking them down, as the kraft paper is liable to fall off.

The enquirer considers that the installation should include a monorail overhead transport device with which should be incorporated a weighing machine to weigh the bunches automatically as they pass along, a machine for making paper pads for filling in gaps in the bunches and a conveyor belt transporter for conveying bunches to lorries, unless the overhead monorail transport device can be made to do this also.

Interested manufacturers should write direct to the Spanish firm. At the same time they should copy their initial correspondence to the British Embassy, Commercial Section, Calle Fernando el Santo 16, Madrid, so that the enquiry may be pursued.

Packaging

This new design for Smedley's steak and kidney pie, by the Metal Box Co., Ltd., is lithographed on to their can lids in six colours, and replaces the one used for the last four years.

Polythene film for fish packs

Fresh water trout sales have increased by approximately 9 tons every year since Union Carbide polythene film has been used to reduce spoilage and preserve the flavour of this delicacy, according to the packers, Snake River Trout Company, Buhl, Idaho, U.S.A.

Claimed to be one of the world's largest packers of rainbow trout, Snake River packs over 6,000 rainbow trout from their hatcheries every day. Three or more days may pass before the fish is served, yet the film helps preserve the flavour.

Sales in San Francisco and Los Angeles alone have been increased six fold, it is said.

The polythene package containing 5 lb. of trout has proved easier to handle than the metal containers previously used and has eliminated costly return of empties.

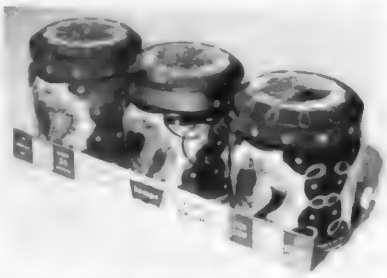
Bags measuring 12 x 16 in. are used to enclose the fish, and are then inserted in fibreboard cartons that are packed in 0.075 mm. film of Union Carbide polythene.

New can tray

Milk chocolate table finger biscuits from Kemps are available in *Can Trak* trays, which hold three containers. The drums and trays are manufactured by the Metal Box Co., Ltd. The trays were originally designed to hold at the top three food cans or three beer cans, all of the same diameter; this is the first time they have been used in this country to grip containers from the bottom. *Can Trak* is a form of multiple packaging which is said to be new to this country, and to be ideal for special offers and mixed multiple packs. The trays can be filled by hand. They are of strong cardboard, slotted to hold the three drums firmly, and printed on the sides and the base to identify the material on display. They are claimed to be easily stacked, bold on display, and informative, encouraging multiple sales as gifts, yet leaving an unobstructed view of each canister.

Each Kemps "budgie" drum pictures eight named budgerigars; the complete set shows twenty-four. The drums are bulged, with deep, snug lids to protect the contents.

Packing trout in polythene film, claimed by the packers, Snake River Trout Co. of U.S.A., to prevent spoilage and preserve flavour.



A new device designed and manufactured by the Metal Box Co. is the "Can Trak," a form of multiple packaging consisting of strong cardboard trays and slotted to hold three drums of cans, as shown by these biscuit tins.

Swiss soups in British packs

The full range of ten Knorr soups by Anglo Swiss Food Products, Ltd., which till now have been marketed in pockets of Continental manufacture, will soon be packaged in pockets made from laminated foil x paper x *Pliofilm* manufactured by the Plastics Group of the Metal Box Co., Ltd.

There will be no change in the well-known current design which is printed in four colours by the gravure process.

Smedley's new pack

Smedley's have introduced a new design for their steak and kidney pie.

It is lithograph printed on to their can lids in six colours. The picture of the pie, clearly showing the short crust pastry and the pieces of steak and kidney, is in natural colours whilst the top and bottom bands of the can are in yellow, and the name Smedley's is in white on a blue background. The new design replaces the one in use for the last 4 years, and was designed by the Metal Box Co., Ltd., to have a family resemblance to Smedley's other two pies, the Angus steak and Devon lamb.

Trade Marks

KLYDEX.—B786,464, and **MELCOE.**—786,470. Margarine, edible cooking fats and edible oils (for food). **Clyde Oil Extraction Ltd.**, King George V Dock, Glasgow, S.W.1.

SEA MIST.—786,823. Canned fish. **B. N. Sexton and Co. Ltd.**, Plantation House, Eastcheap, London, E.C.3.

TAST-O-FREEZ.—787,634. Preserved fruits, fruit pulp, fruit purée, vegetable extracts (for food), all for use in serving or for making frozen confections or iced drinks; and milk beverages (without alcohol). **Tastee Freez International, Ltd.**, 350, King Street, London, W.6.

POLKA.—789,378. Fresh, cooked, preserved and canned meats. **Ridpath Brothers, Ltd.**, Oldbourne Hall, 43-44, Shoe Lane, London, E.C.4.

SUNDELL.—786,466. Margarine, edible cooking fats and edible oils (for foods). **Clyde Oil Extraction, Ltd.**, King George V Dock, Glasgow, S.W.1.

SILVATOL.—786,471. Margarine, edible cooking fats and edible oils (for foods). **Clyde Oil Extraction, Ltd.**, King George V Dock, Glasgow, S.W.1.

BEEFARONI.—788,981. Food preparations included in Class 29, principally of beef and macaroni. **Simpson Ready Foods, Ltd.**, The Garden Factory, Urmston, Manchester.

BRITUS.—791,248. Edible oils and edible fats. **Briess, Pintus and Co., Ltd.**, Royal London House, Finsbury Square, London, E.C.2.

BRILLARD.—791,448. Edible lard. **Briess, Pintus and Co., Ltd.**, Royal London House, Finsbury Square, London, E.C.2.

BUZZARD.—791,630. All goods included in Class 29. **William Simmons, Ltd.**, Leighton Flour Mills, Mill Road, Leighton Buzzard, Beds.

GRASSAROME.—791,804. Jellies (for food), jams; eggs, milk and dairy products (for food); edible oils and edible fats; fruit preserves and vegetable preserves; and pickles. **Lautier Fils, Ltd.**, Power Road, Chiswick, London, W.4.

TEST MATCH.—783,964. Non-medicated sugar confectionery being sweets. **Chix Confectionery Co., Ltd.**, 15d, Argyll Avenue, Trading Estate, Slough, Bucks.

ESPRESSO.—784,046. Puddings and pies, all containing meat, poultry or fruit and all being frozen; and ice cream. **Northern Dairies, Ltd.**, 287, Beverley Road, Hull.

TOWER BRAND.—784,232. Pork pies, meat puddings and sausage rolls, all for sale within a radius of 100 miles of the Town Hall, Evesham. **Collins Brothers (Evesham), Ltd.**, Mill Street, Evesham.

WILKINSON'S MINTSORTS.—785,247. Liquorice sweetmeats and sugar sweetmeats, none of them being medicated and all flavoured with mint. **W. R. Wilkinson and Co., Ltd.**, Ferrybridge Road, Monkhill, Pontefract, Yorks.

ELDORADO TOPPER.—785,372. Non-medicated sugar confectionery. 786,276. Ice cream confections; ice cream and water ices. **Eldorado Ice Cream Co., Ltd.**, 14, West Smithfield, London, E.C.1.

BOOMERANG FRESHMINT.—786,376. Mint-flavoured bubble gum, being chewing gum. **Boomerang Confectionery, Ltd.**, Victoria House, London, W.C.1.

Recent Patents

825,616. Fromageries Grosjeans Freres S.A.: Wrappings for substantially triangular portions of cheese, and apparatus for forming the wrappings.

825,728. J. R. Lane (T. S. Gorton): Method of separating fish meat from the skeleton of previously filleted fish.

826,075. G. Rosa: Device for frying, at constant temperatures, various foodstuffs, particularly fish.

826,086. D. Bayham: Steam cookers.

826,166. B. Stahmer: Sliced potato product and method of making same.

826,226. Rootry Exploitatie Mij N.V.: Manufacture of margarine.

826,250. Gerber Products Co.: Process for producing a strained meat product.

826,554. T. Hedley and Co. Ltd.: Manufacture of margarine.

826,584. G. Thomas: Slicing devices for cutting bread, cake or the like.

826,706. American Tansul Co.: Treatment of beer.

826,711. W. Henning: Method and device for shelling long-tailed crayfish, in particular shrimps.

826,801. Distillers Co., Ltd.: Recovery of sucrose esters.

827,074. Safety Industries, Inc.: Apparatus for centrifugally milling wheat or like grain into flour.

827,172. Unilever, Ltd.: Cocoa-butter substitutes.

827,361. Unilever, Ltd.: Fatty condensation products.

827,391. Vitamins, Ltd.: Materials having vitamin E activity.

827,652. General Foods Corporation: Corn popping.

New patents are from the Journal of Patents and new trade marks are from the Trade Marks Journal. In each case permission to publish has been given by the Controller of Her Majesty's Stationery Office. Each of the publications is obtainable from the Patents Office, 25, Southampton Buildings, London, W.C.2.

Notes for Contributors and Authors

The Editor of Food Manufacture welcomes articles, news items and other contributions on all aspects of food production.

The purpose of this journal is to exchange information between all those concerned in the food industry. Articles should therefore be written in a readable style, avoiding esoteric terminology and technical jargon, and should contain factual and practical information.

A preliminary synopsis should, preferably, be sent to the Editor, and the contribution itself should be typed in double spacing on one side of the paper only. It should bear the name and address of the author and should be accompanied by photographs suitable for illustrations.

New Companies

T. W. Bakeries, Ltd. (638534.) To carry on the bus. of bakers, etc. £3,000. Dirs.: G. T. Brown and R. T. Edwards. Subs.: Leslie T. Horner, 3, Salisbury Road, Canterbury, and George B. Lodge.

E. and M. Bland, Ltd. (638753.) 9, Victoria Avenue, Blackley, nr. Manchester. Bakers and confectioners, etc. £1,000. Dirs.: C. A. Harrison and A. B. Mitchell.

J. Davis Frozen Foods, Ltd. (638506.) 16, Monument Street, London, E.C.3. £5,000. Dirs.: Harold Sidwell, Dale A. Sidwell and Joe Davis.

Dinwiddie (Chocolates), Ltd. (640057.) £2,000. Subs.: B. Broadbent, 2, Bleak House, Henley, nr. Huddersfield, and M. Shaw.

Energy Foods Propriatory, Ltd. (638665.) 10, Little College Street, London, S.W.1. £100. Dirs.: R. T. P. Wilson and G. C. W. Radcliffe.

H. Jenkins of Skewen, Ltd. (639968.) 142 and 143, New Road, Skewen, Glam. Confectioners, chocolate and sweet mnfrs., bakers, pastrycooks, etc. £100. Subs.: Marion Simmons and Edith Moss.

Prices (Ipswich) Bakers, Ltd. (638685.) £100. Subs.: A. A. Simes, 53, Longfield Avenue, London, N.W.7, and P. M. Callaghan.

Prices (Liverpool) Bakers, Ltd. (638686.) Other details similar to Prices (Ipswich) Bakers, Ltd.

Reelvac, Ltd. (638255.) 22, Dunstable Road, Luton, Beds. Mnfrs. of and dlrs. in food packing machinery, etc. £100. Dirs.: J. B. McLaren and Y. C. Edenborough.

K. Wilcox, Ltd. (638775.) 31, Boothferry Road, Goole, Yorks. Mnfrs. of and dlrs. in boiled sweets, chocolates, biscuits, jams, preserves, etc. £100. Dir.: Kathleen Wilcox

Harrisons Confectionery, Ltd. (639090.) 78a, Park Street, Thame. Mnfrs. of and dlrs. in chocolates, etc. £4,000. Dirs.: R. C. Holland and Jeoffrey Harrison.

Longs Dairies (Bristol), Ltd. (640273.) 492, Stapleton Road, Bristol, 5. £3,000. Dirs.: Wm. C. Long and R. J. Long.

Massarella Ice Cream Co., Ltd. (641082.) £100. Subs.: Lewis Massarella, Cooke Street, Bentley, nr. Doncaster, and J. L. Massarella.

Peeled Potatoes Co., Ltd. (640348.) Adams Place, Georges Road, London, N.7. Processors of vegetables, etc. £100. Dirs.: T. A. Proughton and P. A. Powell.

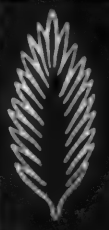
R. and H. Roberts, Ltd. (641091.) 103, High Street, Golborne, Lancs. Bakers, confectioners, grocers, provision merchants, etc. £3,000. Permt. dirs.: Reuben and Mrs. Maud H. Roberts.

Soobroys, Ltd. (641953.) 132, Spon Street, Coventry. To take over the bus. of confectioners and bakers carried on at 80, Walsgrove Road, 332, Radgrove Road, 288, Gulson Road, and 19, Acorn Street, all in Coventry, by R. G. Coles, and at 132, Spon Street, Coventry, by Mrs. G. R. Rowlett. £5,000. Permt. dirs.: R. G. Coles and Mrs. Gwendolen R. Rowlett.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Number 18 February 1960

The Examination of Edible Oils & Fats (No. 5)



LODERS and NUCOLINE LTD.

INFORMATION BULLETIN

This advertisement is one of a series of Information Bulletins issued by Loders & Nucoline Ltd. Copies are available, together with a folder, on request to Loders & Nucoline Ltd., Unilever House, London, E.C.4.

SPECIFIC GRAVITY AND APPARENT DENSITY

Definitions: *The Specific Gravity at t 15.5°C in air of an oil, is the ratio of the weight in air of a given volume of the oil at t °C to that of the same volume of water at 15.5°C, all weighings being made with weights adjusted to balance brass weights in air.*

The Apparent Density (grammes per millilitre) in air of an oil at t °C is the weight in air, expressed in grammes, of one millilitre of the oil at t °C, all weighings being made with weights adjusted to balance brass weights in air.

These definitions have been in use in the fatty oil industry for many years; they should be considered as specific for this industry for in other industries these properties may be defined in a somewhat different way. These properties have been chosen since fatty oils are sold by their apparent weight in air, and not by their mass; they therefore provide simple factors for the conversion of volumes to weights. This is very useful as much fatty oil is delivered in bulk form these days, and a supplier is able to fill the tanker to a close approximation of the weight required by a volume difference, the final accurate weight then being obtained by means of a weighbridge. In the conversion of volumes to weights, the Specific Gravity is used where measurement of the oil in imperial gallons at temperature *t °C* is to be converted to tons or kilogrammes; the Apparent Density is used where the volume of the oil at temperature *t °C* is measured in litres. By these means both supplier and customer are able to ascertain rapidly the weight of oil present in a storage tank when required for stock control.

Specific Gravities and Apparent Densities have a limited use, mainly as support for other data, in determining whether a given oil is pure or adulterated. It is interesting to note that hydrogenated oils have lower specific gravities than the unhydrogenated oils from which they were produced. It is found that the reduction in specific gravity is approximately proportional to the degree of saturation applied.

THE THIOCYANOGEN VALUE

Definition: *The Thiocyanogen Value is of fairly recent introduction and has found application in the calculation of fatty acid compositions when used in conjunction with the Iodine Value. It may be defined as the weight of iodine equivalent to the amount of thiocyanogen absorbed by an oil or fat under the conditions specified by the test*

Many oils and some fats contain fatty acids with more than one unsaturated linkage (double bond); examples are Linoleic Acid with two double bonds, an acid which is widely distributed among oils and fats, and Linolenic Acid with three double bonds. Linolenic Acid is the major unsaturated acid of Linseed Oil but is not generally present in edible oils; Soya Bean Oil, however, contains about 6% of this acid These acids are known as non-conjugated, i.e. the double bonds in the carbon chain are separated by at least one methylene group, and when this is the case it is usual for iodine to be absorbed at all the double bonds. Thiocyanogen, however, differs from iodine in that addition of it is less complete. Oleic Acid containing one double bond will be saturated by both iodine and thiocyanogen, whereas Linoleic Acid (two double bonds) will absorb iodine at both bonds but thiocyanogen at approximately only one bond. Similarly with Linolenic Acid, addition of thiocyanogen occurs at only two of the three double bonds present. This difference in the additions of iodine and thiocyanogen enables very useful information to be obtained regarding the nature of the unsaturated fatty acids present in an oil or fat or in mixtures of these.

FORMOSAN PINEAPPLE

TAI-YU

BRAND

IN

SOLID PACK

(5lb. NETT DRAINED WEIGHT)

- WHOLE SLICES
- REGULAR TIDBITS ($\frac{1}{8}^{th}$ Slice)
- REGULAR PIECES ($\frac{1}{16}^{th}$ Slice)
- CRUSHED

- ***Grown from Hawaiian seed in modern hygienic conditions.***
- ***Shipments to all main United Kingdom ports.***
- ***Ideal for Canning, Processing, Catering, etc.***

S. DANIELS & CO. LTD

15 CROSSWALL, LONDON, E.C.3

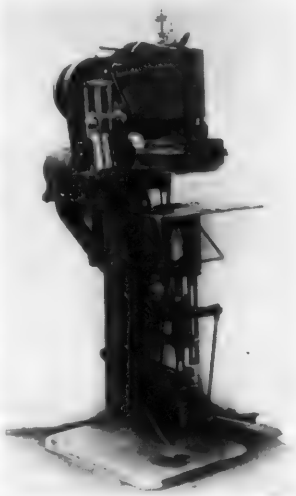
Telephone: ROYAL 3386 (7 lines)

THE COMPLETE CANNING MACHINE

Vacuum seamers combine the dual functions of exhausters and closing machines in one unit. The cold vacuum process reduces costs and produces a better product. The only processing required is sterilisation after closure.

The machine illustrated is half-automatic with fully-automatic vacuumising and stationary can closing head. It is designed to be quickly interchangeable between a wide range of can sizes, i.e. $2\frac{1}{4}$"–$6\frac{3}{16}$" (54–157 mm.) diameter and $1\frac{3}{4}$"–8" (44–203 mm.) high. It is also available as a vacuumising and gas charging machine.

In addition to all meat packs, vacuum seamers can be used for fish, fruit, vegetables, cheese, tobacco, pharmaceutical products, etc.



Write for details of our machines which include high speed, fully-automatic seamers, with and without liquid fillers.

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Telephone:	*Telegrams:*	*Cables:*
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PEPPER & SPICES

MACE, NUTMEGS, GINGER, CINNAMON, ETC.

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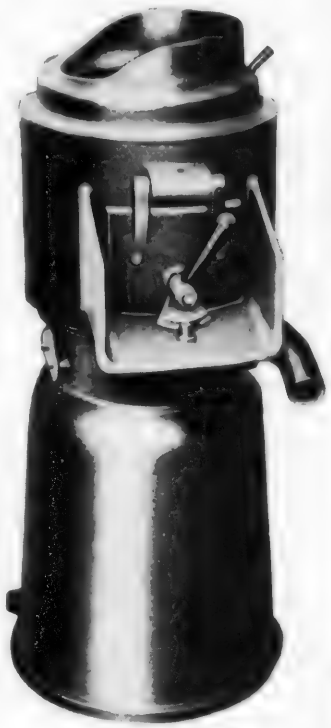
JOHN HUNT GUARANTEED MACHINERY

Super Peeler & Washer

TOTALLY ENCLOSED MODERN STREAMLINED DESIGN



- PEELING TIME FROM 1 TO 3 MINUTES
- POTATOES PEELED AND WASHED WITH MINIMUM LOSS OF WEIGHT

28 lbs. CAPACITY

only £77

Attractive Hire Purchase terms arranged

★ JOHN HUNT MACHINERY IS IN USE IN THE CANTEENS OF THE HOUSES OF PARLIAMENT, ROLLS-ROYCE, etc.

Special features include four alternative positions for chute and six alternative positions for waste elbow. Automatic lubrication. Completely enclosed motor and power transmission. Machine supplied complete with all necessary water and electrical connections ready for immediate use. Fully guaranteed. Write for leaflet.

- Other machines in the "John Hunt" range include—"Duratax" Cake Mixers 10-80 quart models; "Little Champion" Pie and Tart Machines; Power and Hand Paste Rollers, Bun Dividers etc. Brochures always obtainable on request.

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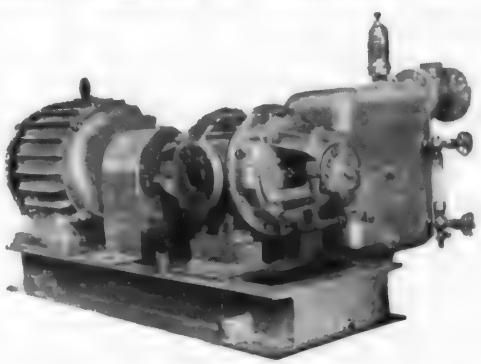
Regd. Trade Mark

IT'S THE SCRUBBING ACTION OF THE LIQUID SEAL AND ENTIRE ABSENCE OF INTERNAL LUBRICATION

NO FILTERS OR AFTER COOLERS



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the processed soya flour

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Moisture	9.42
Protein	39.94
Oil	19.02
Phosphatides	1.90
Non-reducing sugars	10.33
Reducing sugars	Trace
Other carbohydrates (not starch)	13.14
Fibre	1.80
Ash	4.45
	100.00

BRITISH SOYA PRODUCTS LTD

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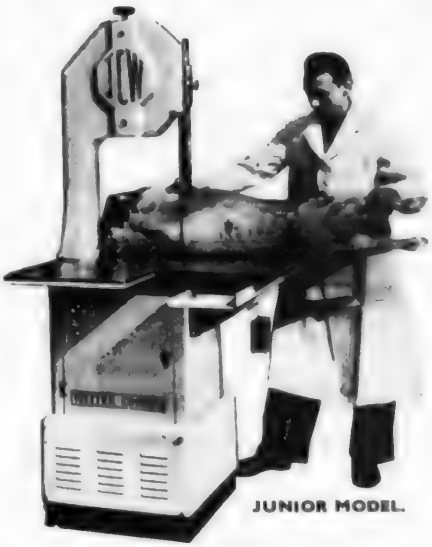

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For shop and Wholesale Factories.

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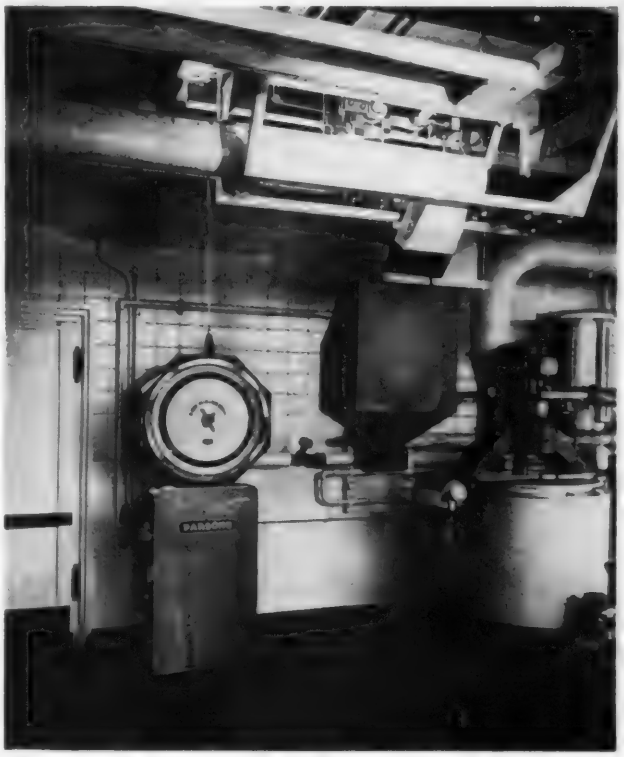

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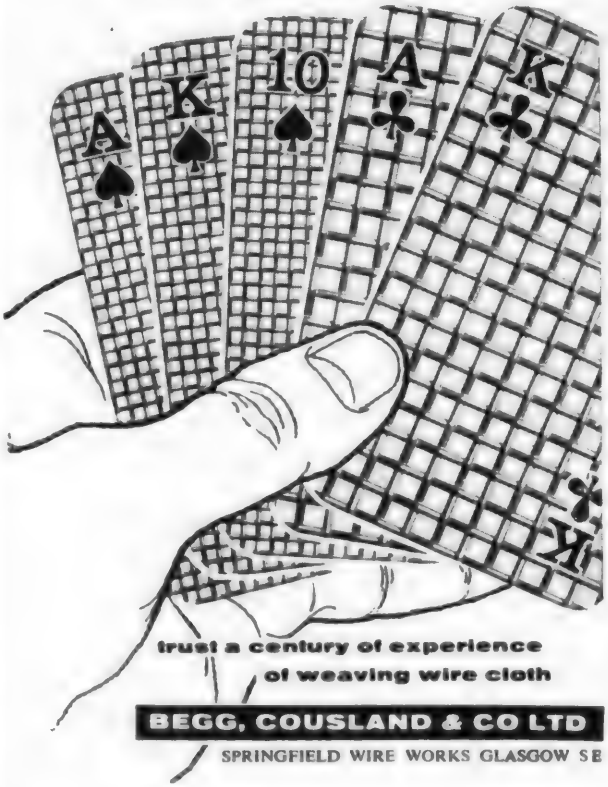

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for jams, molasses, malt extracts, and other difficult substances

Two important additions are now incorporated in this instrument, and can be fitted if required:

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PRODUCTION IS NOW
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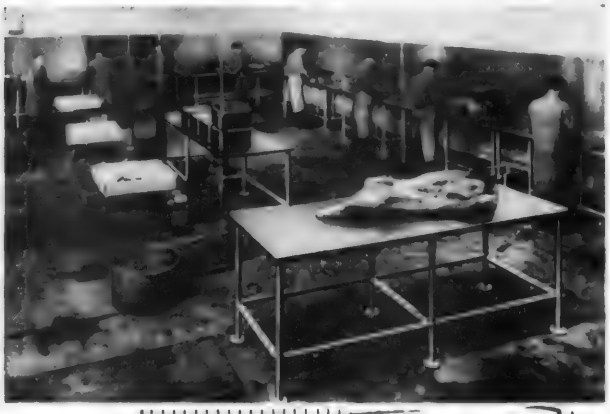

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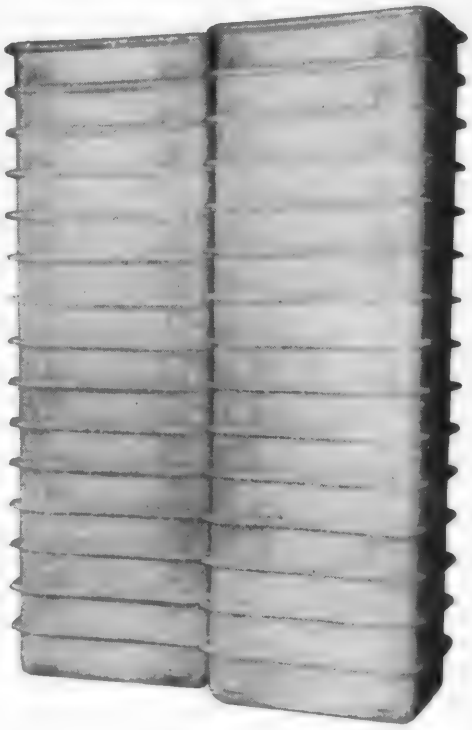

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Light and easy to clean—can be sterilized by boiling and will give many years of normal service

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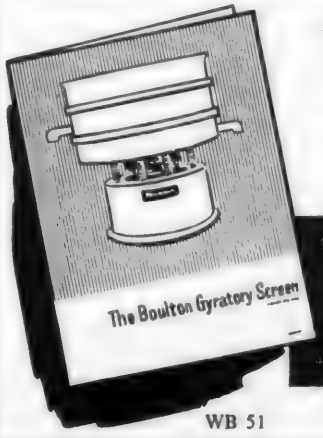

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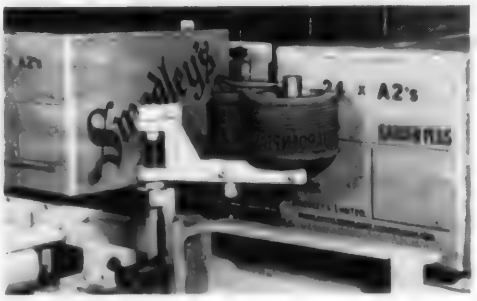

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Automatically re-inks the type after each impression. Uses BASELOCK rubber type in any size.

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terpeneless essential oils

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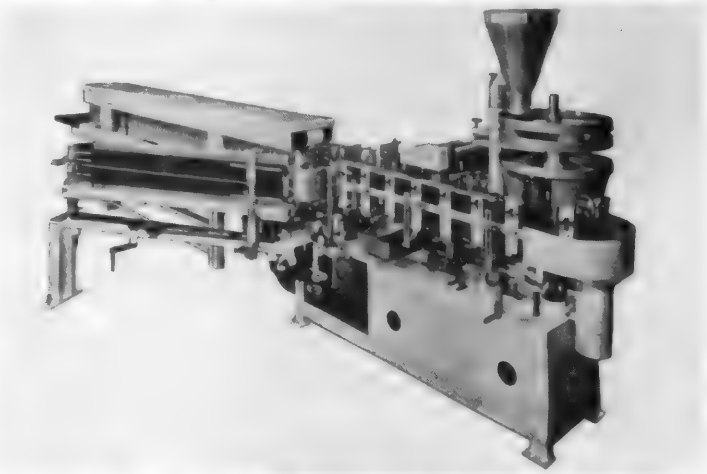
CONTINUOUS

AUTOMATIC CARTON



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Flat cartons are automatically fed into the machine and are accurately filled with granular or powder products and package securely sealed.

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This electric sharpener with the self contained water unit ensures a keener, more lasting edge to your tools. The flat grinding surface and accurate guides make the job so simple, it is a pleasure. Moreover is saves time, saves money, saves knives. There is a separate guide for cleavers.

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SALES Engineer required by long established Northern manufacturer of screens, conveyors, weighing and mechanical handling equipment. Must have extensive and considerable experience within the food manufacturing industry so as to develop the applications for the sale of our equipment within the whole of the food manufacturing industry in this country and Europe. This will be a senior appointment which is permanent and progressive. Salary, Pension, etc.—Send the fullest details to Box B5929, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

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Foster Clark Ltd., Food Manufacturers and Canners, of Maidstone, Kent, require Deputy Chief Chemist now to succeed Chief Chemist upon his retirement in early 1964.

Applicants should be in the middle thirties, must be fully qualified chemists (B.Sc. or equivalent) and have had several years experience in food manufacture, preferably in fruit and vegetable canning.

Substantial salary and first-class prospects offered. Contributory pension scheme.

Please write fully, stating age, salary required and giving details of education and career to date to Managing Director.

CANNERY Production Manager required by old established manufacturers. Applicants should have considerable experience of modern machinery, processes, handling of labour and should be capable of taking an active part in the rapid development of the Company. Terms, which include pension scheme, according to experience. All applications will be treated in the strictest confidence. —Box B5915, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

WRIGHT Hargreaves Eng. Co. Ltd. invite applications for a Technical Sales Representative. Applicants should have knowledge of the food and dairy industry with experience in spray drying, evaporating and general manufacture. The successful applicant would work as assistant to the Sales Director and would be provided with a car, expenses and a good salary, according to experience. Superannuation scheme available.—Reply in writing to Lloyd's Bank Chambers, Bridge Street, Newbury, Berks.

AGENT required for Lancashire and Cheshire by well-known Fruit Canning concern. Must have good established connection with grocery trade.—Please write in first instance to Box B5913, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

AGENT required for Yorkshire by well-known Fruit Canning concern. Must have good established connection with grocery trade.—Please write in first instance to Box B5914, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

ASSISTANT Factory Manager required for Scotland. First-class experience in the Fruit and Vegetable canning industry essential. Capable of taking complete charge of small unit. Pension Scheme. Preferably unmarried. —Full details with salary range to General Works Manager, Lockwoods Foods Ltd., Bridge Road, Long Sutton, Lincs.

CHEMIST required to take charge of a Section in the C.W.S. Preserve Group Central Laboratories, Middleton. H.N.C. or equivalent. Experience in food industry advantageous. Salary according to age and experience.—Apply with full details to Group Manager, C.W.S. Preserve Group, Middleton, Manchester, not later than February 12, 1960.

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The appointment involves the supervision of the whole of the scientific services of the organisation and embraces a wide and interesting field of research of consumer goods and development of processing and manufacture. In addition to textiles, food manufacture, cereal and bacteriological control are outstandingly important. The successful candidate would be required to visit the Society's various establishments throughout the country, assist in the administration of the laboratory and programme future research policy.

The post offers excellent opportunities in technical research. Candidates must have previously held responsible positions in technical research and should possess qualifications including an Honours Degree and preferably F.R.I.C. (Branch E).

Candidates should apply for an application form for this appointment to the Central Labour Department, Co-operative Wholesale Society Limited, 1, Balloon Street, Manchester, 4, before February 22, 1960.

A Chemist with experience in processing of food is required by old established factory in London.

The candidate will be in charge of routine laboratory work. Must also be capable of supervising production control and take charge of research and development of new products.

Salary in accordance to age, experience and qualifications.

Please state age, qualifications and previous experience in strict confidence to Director, Box B5929, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

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PATENT No. 780,996 entitled *Coffee Preparing Machine* is for sale or licence.—For details apply to Chatwin and Co., Chartered Patent Agents, 253, Gray's Inn Road, London, W.C.1.

SITUATIONS WANTED

CHEMIST, F.R.I.C., Branch E, with practical and managerial experience in food technology, process and production control, product development and in a Public Analyst's laboratories is looking for a position of responsibility, either established or with clearly defined progressive prospects, in which this experience coupled with initiative and drive would be utilised fully and reasonably rewarded.—Box B5921, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

FOOD Technologist, qualified chemist and bacteriologist with fifteen years management experience in the food-canning industry, available for consultation or for short-term employment on development projects, factory reorganisation, etc.—Write Box B5925, *Food Manufacture*, Leonard Hill House, 9, Eden Street, London, N.W.1.

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9, Eden Street, London, N.W.1. EUSton 5911.

I.S.I.S. is an organisation backed by a large industrial group of consultants with contacts in all the industries based on technology. As an addition to their present resources they have established this Appointments Register. Below will be found some of those technologists who are looking for further opportunities. Employers and Personnel Officers are invited to complete the form below, detach and send to the above address. In this particular instance the use of a form, with its attendant simplification of office systems, ensures speedier results for the employer.

Ref. A.252. Indian. Male. Age 28. Married. B.E. (Civil), Grad. of I.St.E., 6 months. Work charges overseer and personnel overseer, India, government work. 3 months training as Asst. Engr. Africa. 6 months Tours Planning Asst. Africa—government work. 4 months R.C. detailer, London Consulting Engineers. At present Asst. Engineer with R.C. Specialists and suppliers of cold-worked square twisted reinforcement. Seeks post in London or B.E. Africa as Assistant Engineer. Salary £800 p.a. approx.

Ref. A.253. British. Male. Age 26. Single. A.H.W.C.Ph.D., A.R.I.C. At present Research Chemist, antibiotics and biochemical manufacturers. Seeks post as Organic Research Chemist, London or Provinces. Salary £1,050 p.a.

Ref. A.254. British. Male. Age 39. B.Sc. (Special Chemistry). 6 years Exp. Asst., chemical inspectorate—government department. 11 years Research Chemist, Manufacturers of Antibiotics, in charge of chemical laboratory. Has experience as Safety Officer responsible for high voltage and radioactive work. Seeks post as Analytical Chemist or Administrative Chemist, London. Salary £1,300 p.a.

Ref. A.255. British. Male. Married. Age 43. Equivalent qualifications to Honours B.Sc. in Applied Chemistry. 3 years Asst. Chemist, Chemical Inspection Department, ministry. 4½ years Research and Development Chemist, vitamin synthesis. 2 years Technical Manager and Chemist, ice-cream manufacturer. 4 years Chief Chemist, Industrial Research and Development on Consulting basis. 5 years Chief Chemist, Writing Instrument and Ink Manufacturer. Good basic knowledge mechanical and electrical engineering and considerable administrative experience. Fluent German and reading transl French experience. Seeks Senior Executive Post in Development or Production. Preferably London but would consider Home Counties or S. England. Salary £1,800-£2,000.

Ref. A.256. British. Male. Married. Age 44. B.Sc. (App. Chem.), A.R.I.C. 10½ years Chemical Engineer (Pilot Plant) with Chemical and Instrument work also 3 years Research Assistant in Chemical Engineering with Lecture Duties (University). 7 years Refinery Assistant (Process-Operation) and Research Chemist (with instrumentation duties). Petroleum Refining and Conversion Co. Seeks post as Chemical Engineer (Process Dept., Process Control), or Works Chemist, or post involving development of scientific instruments, etc. or Industrial Education Officer. London, Provinces or Abroad considered but Home Counties preferred. Salary £1,500 p.a. U.K. or £2,000 p.a. Abroad.

Ref. A.257. British. Male. Married. Age 40. B.Sc. (Bot.), Dip.Agric.Sci. 4 years Botanist (Plant Breeder), Malaya, responsible for initiation of breeding selection and agronomic programme for improvement of pineapple growing and for soya bean and groundnut selection and rice selection and breeding. 4 years Senior Botanist—responsible for initiation and implementation of plant production programme, including rice, oil palm, coconut, cacao, pineapple, legumes, etc. 8 months assigned as Plant Production Expert F.A.O. to report on methods of rice production. Seeks post as Plant Breeder, Agronomist, or Agricultural Research, U.K.—preferably Provinces. Salary £1,500 p.a.

Ref. A.259. British. Male. Age 27. Married. B.Sc. (Chem.—Bot. and Zoo). Qualified as Russian translator. At present Chief Asst. leather research labs. Seeks post as Chemist, abroad, preferably Canada or Rhodesia with salary equivalent to £900 p.a. in U.K.

Ref. A.260. British. Male. Single. Age 26. G.C.E. (A), Chem., Physics, Maths., Grad. of Royal Inst. of Chem. At present Laboratory Technician—oil. Fully conversant with modern analytical methods, such as polarography, flame photometry, spectroscopy, chromatography, etc. Seeks post as Analytical Chemist, anywhere abroad, preferably S. America. Salary £900 p.a.

Ref. A.261. British. Female. Age 27. Single. H.N.C. Chemistry, Inter. B.Sc. Chem., Physics, Biology, Part I B.Pharm. At present Chemist in Research Laboratory, experience of general water treatment, application of ion-exchange to industrial problems of effluent purification and treatment and experience of various types of instruments, i.e. polarograph, *p*H meter, conductivity bridge and volumetric and gravimetric analysis. Taking course in plastics technology. Seeks post London, Kenya, Rhodesia or S. Africa as Industrial Chemist. Salary £720 p.a. minimum.

Ref. A.262. British. Male. Age 27. Married. Higher School Cert. Studying for O.N.C. (Mech. Eng.). 2 years Draughtsman, Air Eng. and Pneumatic. 2 years Fitter (Army). 1 year Draughtsman, special purpose machinery. 2 years Draughtsman, sheet metal fabricators. At present Fitter, Motor Engineers. Seeks post in London as Draughtsman £13-£14 per week.

Ref. A.263. British. Male. Single. Age 24. B.Sc. Zoology with Chem. and Botany as ancil. subject. Special study in Marine Ecology. Seeks post U.K. (Provinces)—Supervisory, Advisory or Research. Salary £800 p.a. minimum.

Ref. A.264. British. Male. Single. Age 27. M.A. (Engineering). 6 months Technical Assistant, chartered patent agent, 2 years Assistant in Economics and Statistics Department industrial gases. Asst. to Sales Manager, electric fan manufacturer. More interested in commercial side of business where technical background may be useful, and seeks Technical Sales or Technical Liaison post. London, preferably with opportunity for travel. Salary £1,100 p.a.

Ref. A.265. British. Male. Married. Age 42. B.Sc. Metallurgy, Physics and Chem. 2 years Metallurgist Engr., bearing manufacturer. 4 years Metallurgist Chemist, government department. 8 years Senior Metallurgist light mechanical and electrical engineering. 2 years Chief Metallurgist, non-ferrous and ferrous foundry. 6 years Chief Metallurgist and Materials Engineer light mechanical and electrical engineering. Seeks Technical/Administrative appointment, London or S. England preferred. Salary £1,500 p.a. minimum.

Ref. A.266. British. Male. Single. Age 22. B.Chem. Engg., Grad.M.Inst.Chem.E. 7 months. Shift Chemist, Explosives Manufacturer. At present Graduate Apprentice, machinery manufacturers. Seeks post Design, Development, Plant Work, Chemical Laboratory in London. Salary £650 p.a.

Ref. A.267. British. Male. Age 37. Married. 4 years Apprentice, Draughtsman, General Engineers. 10 years Jig and Tool Draughtsman/Planning Engineer, aircraft component manufacturers. 3 years Chief Estimator, hydraulic engineers. 1½ years Works Manager, special purpose vehicle manufacturers. 3 years Senior Planning Engineer, aircraft ancillary component manufacturers. Seeks post Provinces (South). Salary £1,000 p.a.

[Continued overleaf

To: I.S.I.S. Appointments Register, 9, Eden Street, London, N.W.1. Please ask the following applicants to communicate with the undersigned:

Ref.:_____	**Ref.:**_____	**Ref.:**_____	**Ref.:**_____
Ref.:_____	**Ref.:**_____	**Ref.:**_____	**Ref.:**_____
Ref.:_____	**Ref.:**_____	**Ref.:**_____	**Ref.:**_____

Please use Block capitals

Name: _____

Position: _____

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All introductions are made on the understanding that should an engagement result the employer agrees to I.S.I.S. Appointments Register's terms, which are as follows:

For each person engaged the equivalent of one weeks salary payable by the employer within fourteen days of the date of engagement.

Signature_____ Date_____

I.S.I.S APPOINTMENTS REGISTER (Continued from overleaf)

Ref. A.268. British. Married. Male. Age 28. H.N.C. Chem., Physics, Maths. At present studying for degree in Chem. Engg. 4 years Shift Chemist, research and development on industrial chemical processes. 3 years Chemist in Charge, Research and Development on process for making a cellulose derivative. 1 year Production Manager, fine chemical manufacturers. Seeks post concerned with chemical engineering, research and development, or otherwise. Preferably U.K. but would consider abroad. Salary £800-£900 p.a.

Ref. A.271. Pakistani. Male. Married. Age 27. B.Sc. Chem., Geology and Geog. 4 years Inside Sales Personnel, Oil Co. 3 years Assistant Chemist (Analytical), Manufacturing Metallurgists. Seeks post as Assistant Chemist (Analytical) London. Salary £720 p.a.

Ref. A.272. British. Married. Male. Age 41. B.Sc. Chem. 3 years Development Chemist and 8 years Plant Manager, industrial chemicals. Taking course for A.M.I.Chem.Eng. and has considerable chemical engineering knowledge. Seeks post U.K. or abroad, preferably Canada. Salary £1,200 p.a.

Ref. A.273. British. Male. Age 30. Married. B.Sc. Geology. 2 years Trainee Geophysicist. 1 year Administrative Asst., geophysical exploration. 2½ years Prospecting Officer, coal mining. Seeks appointment as Geologist/Geophysicist or related administrative work. U.K. preferably provinces. Salary £900 p.a.

Ref. A.274. Indian. Single. Male. Age 24. B.Sc. Chem. and Botany., LL.B. at present studying as part-time research student for M.Sc. 1 year Chemist (Production) Manufacturers and Importers of Drugs. Seeks post preferably London or U.S.A. as Chemist or Technician.

Ref. A.275. British. Male. Single. Age 30. Inter. B.Sc. Physics, Chem., Pure and Applied Maths. 6 months Lab. Asst., synthetic rubber manufacturers. 2 years Research Lab. Asst., chem. manufacturers. 2 years Research Asst. container manufacturer. 3 years Lab. Asst. Chem. Manufacturer. Seeks post London or Provinces as Industrial Chemist (Production or Research). Salary £650 p.a.

Ref. A.276. British. Male. Married. Age 34. B.Sc. Geology, A.M.Inst. Mining and Metallurgy. F. o Geological Soc., M. of Mineralogical Soc. 7 years Geologist, Geological Survey Department. Colonial Service, Africa. 2½ years Geologist Class I, Cyprus Geological Survey Department Exper. of mineral exploration, geological mapping, water supply and boreholes, dam and bridge siting; engg. geology exam. and assessment of mineral prospect, metalliferous and radioactive and non-metallic. Seeks post England or abroad, temperate climate preferred but prepared consider tropics, as geologist, possibly as geological adviser to civil engg. consultants. Salary £1,500 plus allowances.

Ref. A.277. British. Male. Age 44. Married. O.N.C., H.N.C., C. & G. Final Radio Communications, A.M.I.E.E., M.Brit.I.R.E. 5 years Trainee electronic equipment. 7 years Designs Engineer, electronic Equipment. 4 years Manager electronic equipment. 3 years Asst. to Managing Director and 3 years Director, cable maker/electrical accessories and electronic equipment. 3 years General Manager, light industrial/electronic equipment. Seeks Executive appointment—General Managerial or Technical Sales, London or S. England. Salary £1,800 p.a.

Ref. A.278. British. Male. Age 22. Single. O.N.C. (Mech.). Experience includes 4 months Draughtsman, lift makers; 2½ years Estimator, civil engineers. At present Estimating for brewery engineers. Will consider any technical post with large company offering good prospects. Commencing salary £11 10s. 0d. per week.

Ref. A.280. British. Male. Married. Age 32. H.N.C. (Chem.), A.R.I.C. 6 years Laboratory and Plant Chemist, oil industry. 8 years Works Chief Chemist, gas industry. At present Research and Development Chemist, manufacturers of heavy chemicals. Seeks post as Plant Chemist, Liverpool area preferred, or as Analytical Chemist in Dublin. Salary £1,300 p.a.

Ref. A.281. British. Male. Single. Age 24. O.N.C. and H.N.C. (Mech. Eng.), G.I.Mech.E. 5 years Apprentice, 1 year Draughtsman, 2 years Designer, in Electrical Engg. Research Labs. of Mech. Engg. Dept. At present Engg. Buyer, synthetic rubber and rubber goods manufacturer. Seeks post in direct contact with Mechanical Engg. which will lead to managerial position. London area, or Canada. Salary £1,050 p.a.

Ref. A.283. British. Male. Married. Age 31. B.Sc. (Tech.), A.M.I.Struct.E. 1 year Site Engineer, building contractors. 1 year Assistant Engineer, local government. 4½ years Designer, reinforced concrete designers. 1½ years Management Trainee, building and civil engineering contractors. Seeks post as Area Resident Engineer with consulting engineers in W. or S.W. England. Salary £1,350 p.a.

Ref. A.284. British. Male. Married. Age 27. C. & G. Telecomms. Certs. 5 years Technical Officer, Post Office Engg. Dept. 1½ years Tech. Operator and Chief Operator, broadcasting. 6 months Engineer television. Seeks Management Trainee post, or otner responsible appointment in Electronic or Electrical or Light Engineering Industry. Provinces. Salary £1,450 p.a. minimum.

Ref. A.285. British. Male. Married. Age 25. B.Sc. (Chem. and Physiology). 4 years Laboratory Assistant, antibiotics. At present Supervisor of microbiological and chemical assay, antibiotics manufacturers. Seeks post, preferably S. England as Research Biochemist. Salary £900 p.a.

Ref. A.286. British. Male. Married. Age 27. B.Sc. Physics with Maths., Astronomy and Geology. At present Chief Technologist, paper makers. Seeks post as Technical or Production Manager, provinces or abroad, anywhere considered. Salary £1,500 p.a.

Ref. A.287. British. Male. Married. Age 58. B.A., B.Sc. (Chem.), F.R.I.C., O.B.E. 25 years Chief Research Division, Agriculture, Sudan. 4 years Overseas Research Co-ordinator and 1 year Deputy Director of Research. 5 years Technical Information Manager. At present engaged in Writing. Knowledge of soils, fertilizers and pesticides, control of agricultural research and development and of Egypt, Sudan, E. Africa, C. Africa, S. Africa, Ghana. Seeks appointment London, Southern Counties, Overseas Assignments. Salary approx. £1,500 p.a. upwards.

Ref. A.288. British. Male. Married. Age 27. Honours, Physics. 3 years Senior Science Instructor, education. 3 years Geophysicist, oil exploration. Seeks post Provinces—or abroad if family can accompany him. In work concerned with Geophysics or Training Officer in Industrial concern. Salary £1,000 p.a. minimum.

Ref. A.290. British. Male. Married. Age 25. G.C.E. (Advanced) and 2 years towards General Degree. 1 year Research Chemist, Industrial Chemists. 4 months Research Asst. Electrical Engineers. At present (past 4 years) R.A.F. Officer (Pilot). Seeks post as Management Trainee (Tech.). South Midlands preferred, willing to travel and to continue studies as necessary. Salary £650-£700 p.a.

Ref. A.291. British. Male. Married. Age 38. B.Sc. (Spec. Chem.) with subsid. Botany. 7 years Pilot Plant Manager and Plant Manager, chemical manufacturers, involving development and operation of large scale heavy organic chemical plants, all highly instrumented and knowledge and practice of chemical engineering. 2 years Production Manager, chemical manufacturers. Seeks Production Development post U.K., preferably S. England. Salary £1,600 p.a.

Ref. A.292. British. Male. Married. Aged 25. C. & G. Cert. 5 years Fitter and Turner, ship building and repair and marine propulsion engineer. 2 years Fitter/Inspector, Army. 1½ years Maintenance/Inspection Engineer, power stations, chemical engineering. 1 year Production Erection, Test Engineering/Inspection, atomic power station. At present Engineering Inspector Engineering—Atomic, Marine and General. Seeks post Ceylon, West Indies, Burma, New Guinea, Chile or Nigeria as Maintenance Engineering/Construction Plant Engineer/Workshop Supervision. Salary £1,200/£1,400 p.a.

Ref. A.293. British. Male. Age 28. Single. B.Sc. Metallurgy, subsid. Physics, Chem., Elec. Technology, Engg.-Testing and Geology. 1½ years Asst. Metallurgist, automobile electrical accessory manufacturers. At present Senior Metallurgist, aircraft constructor. Seeks post as Assistant Chief Metallurgist or Senior Metallurgist, preferably with engineering Company or Consultant Laboratories. U.K.—Provinces, preferably Bristol or Swindon, but London considered. Salary £1,000-£1,200 p.a.

Ref. A.294. British. Male. Married. Age 36. M.Sc., A.R.I.C., F.R.I.C. 5 years Technical Service, petroleum chemicals. 2 years Head of product dev. lab., soap and toilet articles. At present Research Chemist, manufacturer of petroleum chemical additives. Seeks postion as Senior Chemist or Section Head, Merseyside area. Salary £1,750 p.a.

Ref. A.295. British. Male. Married. Age 43. M.Sc. 20 years Analytical Chemist with consulting chemists. Seeks appointment as Chemist, U.K. London preferred, but provinces considered. Salary £1,500 p.a. minimum.

Ref. A.296. British. Male. Married. Age 42. H.N.C. (Mech. Engg.). 3 years Seagoing Engineer, shipowners. 3 years Engine Draughtsman, shipbuilders and engineers. 5 years Planning Draughtsman, motor car manufacturers. 3 years Asst. to Chief Engineer chemical manufacturers. 8½ years Chief Engineer chemical manufacturers. At present Mechanical Engineer, food canning. Seeks post as Mechanical Engineer. Provinces—Birmingham area. Salary £1,200 p.a.

Ref. A.297. Belgian. Male. Age 32. Single. Degree equivalent B.Sc. (Physics) and Degree Course in Physics, Maths. (Pure and Applied), Chemistry, Philosophy and Psychology. Additional course in Telecommunications and Accoustics. 7 months Apprentice technician business machines. 3 months Computer, computing (commercial). 3 months Asst. to Research Engineer high frequency equipment. At present Electronic Technician, Geophysical Exploration. Seeks post U.K. as Electronics Technician. Salary £850 p.a.

Ref. A.298. British. Male. Married. Age 35. 10 years Assistant Chemist, Metal Smelters. 8 years Chief Chemist, metal manufacturers. Seeks post as Metallurgical Chemist with non-ferrous metal company. Central, N. or N.W. London area. Salary £1,000 p.a. approximately.

Ref. A.299. British. Male. Married. Age 30. B.Sc. Associate of R.Inst. of Chem. 5 years Chemist, chiefly concerned with rubber-to-metal bonding, General Rubber Goods manufacturer. At present Chemist (general chem. lab.), heavy electrical industry, involving corrosion studies of non-ferrous metals and alloys. Seeks Factory Production or Development or Information Services post. Provinces—Home Counties preferred. Salary £1,000 p.a.

Ref. A.300. British. Married. Male. Age 32. B.Sc. (Chem.), A.R.I.C. 3½ years Development Chemist, dyestuffs and antibiotics. 2½ years Section Head, manufacturer of pharmaceuticals. At present Production Chemist. Seeks Production or Development appointment, preferably S.E. London or North Kent or S.E. Essex. Salary £1,400 p.a.

Ref. A.301. British. Male. Single. Age 21. Part I, B.Sc. (Eng.) and intends completing course. 3 years Metallurgical Assistant, research in non-ferrous metals. Seeks post in London as Metallurgical Assistant. Salary £12 0s. 0d. per week.

Ref. A.302. British. Male. Married. Age 33. O.N.C. and reached H.N.C. standard Mech. Engg. Engg. Apprenticeship. 4 years methods Engr. aircraft manufacturer. 4 years Post Graduate course, Production and Design, aircraft manufacturers. 2½ years Deputy to Production Engineer, aircraft manufacturer. Seeks Production Management (Light Engg.) or similar appointment within 50-mile radius of London. Salary £1,100-£1,200 p.a.

Ref. A.303. British. Male. Married. Age 33. O.N.C. (Mech.) and C. & G. (M.V.T.). 3 years Chief Inspector, chemical manufacturers. 2 years Machine Shop Manager, general engineers. 2 years Inspecting Engineer government. 2 years Planning and Prod Progress Engineer, printing. 4 years Marine Engr At present Senior Workshop Superintendent, Africa, transport. Seeks post in warm climate as Supervisory Engineer. Salary £1,000 p.a. approx. Very good knowledge of Arabic.

Ref. A.304. British. Male. Married. Age 35. B.Sc. (Applied Science), A.M.I.E.E. 2 years Grad. Apprentice. 6 months Draughtsman and 6 months Transformer Designer, Heavy Generating Plant and Power Transformers. 6 months Reorganisation of Measurement Section and 5½ years Development of new production, manufacturers of resistors and other electronic components. At present Research Engineer, heavy electrical engineers. Seeks senior position as Development Engineer, preferably in the development laboratory of a small to medium-sized manufacturer of electronic components. U.K. Salary £1,250 p.a. minimum.

Ref. A.305. British. Male. Married. Age 31. H.N.C. (Chem.), Inter. B.Sc. Mech. Engg., Assoc. Inst. Fuel. 3 years Technical Officer, gas manufacturers. 1½ years Assistant Chemist, glass manufacturers. At present Scientific Technical Officer, engaged on reports, preparation on coal survey work and coal analysis. Seeks post as Technical Author, preferably Newcastle-upon-Tyne area. Salary £950 p.a.

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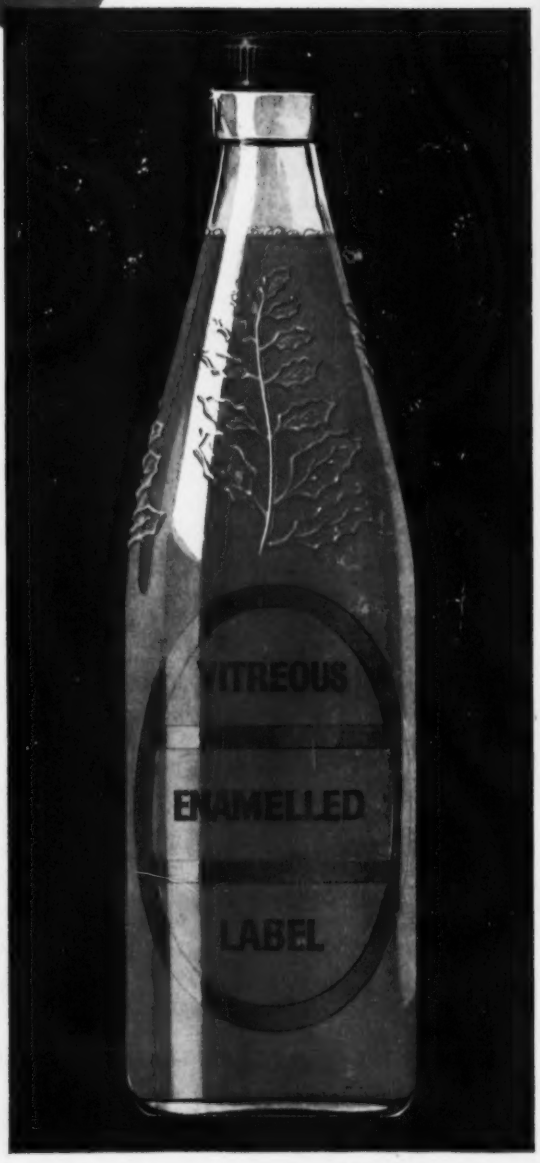
I was a label hater. From the moment they put me in charge of our bottling plant everything came unstuck—me, the labels, the lot. Machinery all gummed up, labels on crooked, labels on crinkled, labels not on at all. Nobody would even speak to me. Then I had a chat with the man from United Glass. He said the best kind of labels aren't *on* the bottles, they're *in* them. Fired right into the glass. Vitreous enamelled labels. Now I get my bottles from him I'm the hero of the factory—and I don't have to do a thing.

Vitreous enamelled labels, in one, two or three colours, screen printed and fired into the glass, take the whole job of labelling off your shoulders. No need to get labels printed. No need for labelling machinery. No relabelling. No clogged washing machines. United Glass will submit designs or work to your designs. And if ever you have a glass packaging problem, the United Glass Packaging Advisory Bureau will always be glad to help. Please get in touch at the address below.



UNITED GLASS

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